THE MEDICAL NEWS AND LIBRARY.

VOL. XXXIV. DECEMBER, 1876. No. 408.

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GOSSELIN'S CLINICAL LECTURES ON SURGERY . . . 16 PAGES.

CLINICS.

CLINICAL LECTURES.

Clinical Lecture on a Case of Malignant Stricture of the Œsophagus. Delivered at the London Hospital, Oct. 17, 1876. By C. F. MAUNDER, F.R.C.S., Surgeon to the Hospital.

GENTLEMEN: You will recollect that while "going round" on Tuesday last I was requested by Mr. Mark Hovell, on behalf of Dr. Sutton, to see a patient with a view to performing gastro-stomachotomy. I will read the notes supplied by Mr. Hovell:—

"James W., aged fifty-seven. Malignant stricture of the œsophagus. Admitted July 5; died October 12, 1876. Patient has been a fairly healthy man, but suffered occasionally from sick headache. No family history of tumours. The first time he noticed anything wrong with his gullet was in May, 1875; and then, while having his dinner, found that one of the first mouthfuls he took (not an unusually large one) remained, after he had masticated and swallowed it, at a place in the œsophagus which he marked by pointing to about the middle of the sternum. He strained hard to swallow the morsel, but could not; then took several glasses of warm water, and after much retching succeeded in bringing the food up again, but he was so frightened at the occurrence that he went home and laid down. He ate his tea as usual that evening, and, as he had no subsequent trouble, gradually forgot the circumstance. Enjoyed good health for four months.

"In September, 1875, he noticed for the first time a sort of roughness in the œsophagus while swallowing, 'as if the food scraped him.' This scraping feeling

Published monthly by HENRY C. LEA, Nos. 706 & 708 Sansom Street, Philadelphia, *for One Dollar a year; also furnished* GRATUITOUSLY *to all subscribers of the "American Journal of the Medical Sciences," who remit the Annual Subscription, Five Dollars, in advance, in which case both periodicals are sent by mail free of postage.*

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gradually increased. In about a fortnight he felt as if there were something in his throat which prevented him from swallowing properly. Food seemed to go down for a certain distance, and then lodge, but on making a strong swallowing movement the food seemed to slip past the obstruction. This difficulty in swallowing slowly and steadily increased, and after a time food which had been swallowed was returned. This obliged him in February, 1876, to confine himself to liquid diet.

"In March he began to find that he could scarcely swallow liquids. He then went to a doctor, and a bougie was passed. After this he was able to swallow liquids for about another month, the stricture being kept open by a bougie passed two or three times a week.

"On admission, urine small in quantity, very cloudy, specific gravity 1019, acid; no albumen, blood, nor sugar. Brandy mixture two ounces, with the same quan- of milk and beef-tea, ordered to be given as an enema every four hours.

"He has been in great part fed by nutrient enemata since admission, and during the first month he was in hospital he gained three pounds in weight. A bougie has been passed from time to time, but the attempt to pass one about a fortnight ago failed, and subsequent attempts have been equally unsuccessful. For the last few weeks only three enemata have been given daily, and at times he could not retain them. The addition of twenty drops of laudanum to each enema, however, enabled him to hold them better. He gradually became more and more wasted, and after y, being unable to retain enemata, complained of distressing thirst and of his mouth being dry.

"On October 11 an operation was performed. He retained an enema the same evening, and one the following morning, but none after. He sank gradually, and died on the evening of the 12th."

I will take up the case from the time of my seeing it. On reaching his bedside I observed some urine in his *pôt de chambre* highly charged with blood, apparently a new feature in his case. Finding that the patient was deemed to be the subject of a cancerous stricture of the œsophagus, I thought it possible the urinary tract might be somewhere similarly affected, and thought it right to postpone the operation that I might see Dr. Sutton upon the subject. You must recollect that healthy kidneys are believed to be essential to the success of a serious operation. Dr. Sutton saw me the next day, and requested me to perform the operation: for although the patient could not last many days, Dr. Sutton thought he would die easier if his intolerable thirst (a most distressing symptom) could be relieved. Dr. Sutton also thought that the blood in the urine might be accounted for by passive congestion consequent on extreme weakness. Both the patient and numerous friends were anxious for operative interference. I concurred with Dr. Sutton.

Operation.—In proposing to do this operation you will take care that your patient is not the subject of transposition of organs—a condition that has twice come under my notice—once in a dead subject and once in a living man. In the man under consideration the liver-dulness was natural, and the left hypochondriac region was markedly tympanitic, as though a distended stomach were there—its usual position. Great emaciation existed, with a receding abdomen. The patient was very feeble, having become unable to retain enemata, but he walked into the theatre. Chloroform was administered, and I made a longitudinal incision, from two to three inches in length, downwards from the point of the ninth rib and external to the sheath of the rectus muscle. Having divided the integuments and broad muscles *seriatim*, I reached the peritoneum, and severed this to a similar extent, and exposed small intestine. This being my first case of gastro-stomachotomy (an operation rarely performed), I had, in searching for the stomach, to rely upon a preconceived notion of the sort of sensation which that organ would yield to my finger when touched by it. I hoped, also, to be guided to it either by the left lobe of the liver, or possibly by the spleen. I altogether failed to detect it; and, having already of necessity explored the

cavity to a degree inconsistent with the principle of *non-interference* (which I advocate and deem so essential to the success of abdominal surgery), I contented myself with opening what might be either colon or stomach. I called your attention to this important principle of non-interference, and illustrated its value by alluding to four cases—two infants and two adults—in which I had advised the making of an artificial anus by opening the abdominal cavity (gastro-enterotomy). Mr. McCarthy operated in one instance, myself in the other three. All recovered—a result I believe due to strict attention to special details. I was the less anxious to determine absolutely by more free exploration at the wound which viscus I was about to open, because, as the chief object of the operation was to relieve thirst, the injection of fluid could be made into either, though in larger quantities into the bowels; and it is a noteworthy fact that as the patient became unable to retain enemata, he complained more and more of thirst. The operation being completed, the patient was returned to bed, and died thirty hours subsequently.

At the post-mortem examination the anterior abdominal wall was cut away so as fully to expose the viscera. The artificial opening had been made in the transverse colon. The pyloric end of the stomach, empty and contracted, could be seen situated high up in the cavity. The left hypochondrium contained a hollow viscus, which Mr. McCarthy, who made the autopsy, at first thought was the distended stomach, but which proved to be the splenic angle of the colon; and this it was which yielded marked resonance on percussion prior to operation. This completely concealed the bulk of the stomach (quite empty and very contracted), which could only have been reached during life by tapping the intestine and dragging it down when collapsed. The intestines were greasy, as in the first stage of peritonitis. The middle of the œsophagus was the seat of cancer, and the right lung had a large nodule of a similar growth in it. The kidneys were congested, but no malignant deposit was found in them; and thus the blood in the urine was explained.—*Medical Times and Gazette*, Nov. 11, 1876.

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Clinical Lecture on Stricture of the Urethra.—Delivered at the Liverpool Royal Infirmary. By Reginald Harrison, F.R.C.S., Surgeon to the Infirmary.

Gentlemen: The practice of this infirmary affords you abundant opportunities of observing the surgical disorders of the genito-urinary system, and of these cases of stricture of the urethra and the complications arising out of it form no inconsiderable proportion. Associated as I have been for some years with two of the hospitals in this town deriving a large number of their patients from the seafaring population connected with the port, my observation leads me to believe that amongst this class of the community stricture is a common disorder. And that it should be so is not surprising. Gonorrhœa, contracted on shore, in the debauch that frequently precedes the vessel's departure for some foreign part, breaks out two or three days afterwards. Treatment, except in the case of certain passenger vessels, is usually conducted by the captain or his mate, and not always with advantage to the patient. The old notion that every disorder consequent on promiscuous intercourse is "venereal," and must be treated by mercury, still prevails; and large doses of calomel, until profuse salivation is produced, is not rarely the only remedy administered for a gonorrhœal discharge. Some of the worst cases of stricture that I have seen have been occasioned, under similar circumstances, by resort to the most primitive proceedings for the relief of retention of urine. In the absence of catheters from the ship's medicine chest, or still more frequently, as I have found, from their rottenness, I have known instances where the wire from a soda-water bottle and an iron skewer have done duty in "forcing" a stricture. It is only a short time ago when a man was admitted into No. 1 ward with retention and a badly lacerated urethra, as a consequence of an attempt on the part of the mate of his ship to reach the bladder by the aid of a pointed piece of wood,

roughly modelled to the shape of a bougie. In this instance the mate was more than professionally interested, inasmuch as he had occasioned the retention by kicking the patient behind the scrotum. The most remarkable piece of ingenuity some of you will remember as occurring a few months ago, where, after a sailor had endured for over three days the agonies of retention, an endeavour had been made to introduce through the urethra a piece of lead gas-piping, which had been devised, *in extremis*, for the purpose by the engineer of the ship. Unfortunately, however, this failed to effect the purpose. When I saw him on his arrival here, on the fourth day of retention, I found the urethra much lacerated, and it was with considerable difficulty that I introduced a catheter, and removed a large quantity of the most fetid urine imaginable. Relief, however, came too late, the man dying shortly after his admission with convulsions and uræmic poisoning.

Though deploring that persons should be placed by circumstances in such unfortunate positions, I mention these cases for the purpose of showing you that your field for observation in this department of surgery is by no means restricted to routine, or even to the freaks of nature or disease. In undertaking to say anything about the treatment of stricture, I am conscious that the subject is a well-worn one. Still, with all our plans of treatment, we have not arrived at anything like uniformity of practice, and as this is only to be obtained by taking the sum of our respective experiences, I feel less hesitation in bringing under your notice some conclusions which my own experience, chiefly gathered in the wards of this hospital, has enabled me to arrive at. These considerations I hope to place before you during my course of clinical lectures this session. In using the term "strictnre," I reserve it, as Sir Henry Thompson suggests in his eminently practical work on Diseases of the Urinary Organs, for one kind of stricture: viz., organic stricture. "Spasm" and "inflammation" are conditions more or less transient, but do not constitute stricture in the acceptation of the term which is now generally adopted. The causes of strictnre are various. Let me give a few illustrations. A patient has a venereal sore on his glans penis involving the meatus. When this heals a cicatrix is left. Cicatrices are more or less disposed to contract, and in this instance result in the narrowing of the urethral orifice. This condition was well illustrated by a case in No. 7 ward, where the same state of things was produced by an improperly performed operation for circumcision; a portion of the glans penis having been removed along with the prepuce. When the sore healed, the cicatrix contracted, and the patient presented himself here with a tight stricture of the meatus requiring division. Another cause of stricture amongst our sailor patients arises from injuries where the urethra becomes bruised or lacerated. A man falls from aloft across a spar or a rope, and ruptures his urethra. If the patient recovers from the immediate effects of the injury, it is with his urethra scarred. Here we have the worst variety of stricture—traumatic—a form of the disorder more obstinate to deal with than any other. In our inquiries as to the cause of stricture, we find that by far the larger proportion of our patients attribute their misfortune, directly or indirectly, to previous attacks of gonorrhœa. Those who do so *directly* are disposed to look upon the stricture as the natural consequence of their previous mishap. Those who do so *indirectly* usually have something to say about the treatment employed and its bearing upon the subsequent formation of a stricture. It is worth our while for a moment to analyze the statements made by this latter class with the view of ascertaining how far their allegations hold good. "I was almost cured of my gonorrhœa, only a very slight discharge remaining, which I thought would go away of itself," is the statement of the patient who is convicted of his own indiscretion in having allowed things to go on from bad to worse. Others, again, seek refuge in referring their misfortune to the improper advice they have received. "I was told that it was only a gleet, due to weakness, which

THE

MEDICAL NEWS.

MDCCCLXXVI.

VOL. XXXIV.

PHILADELPHIA:
HENRY C. LEA.
1876.

PHILADELPHIA:
COLLINS, PRINTER.

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formation of a new periosteum all along the solution of continuity of the primitive periosteum; and it is probable that the materials for this repair have been supplied not only by the periosteum itself, but also by the muscular layer which has participated, more or less, in the solution of continuity, and which, at all events, participates in the consecutive phlegmasia. You will thus appreciate what there was of truth and what of exaggeration in the celebrated opinion of Duhamel, an opinion shared by many experimenters, and notably by Dupuytren, Breschet and Villermé, Flourens, Lebert, that the periphery of the callus, what they called the external ferrule, was formed by the thickened periosteum. This is true for the portions of this membrane which lie above and below the solution of continuity, but at this latter point the capsular ferrule is completed by a tissue of new formation which is a periosteum, if you choose, but a new or cicatricial periosteum which is the result of a prompt transformation of the lymph or blastema exuded after the accident. There was evidently exaggeration on the part of Duhamel and his successors, when they attributed the whole ferrule to a thickening of the normal and primitive periosteum.

As for the marrow and the space between the fragments, you see there nothing more than the infiltration of blood, and thus you determine a first period characterized at once by effusion of blood, effusion of lymph, repair by means of the latter of the periosteum, and its thickening, which seems to me to be undeniable, and as to the existence of which, I am surprised to see doubts expressed in some works, particularly in that of Billroth.

II. Here now are two guinea-pig femurs broken eight and nine days ago, in which the fragments, instead of remaining end to end, have overlapped. You still find liquid blood at the extremity of the fragments and between the surfaces where they correspond to one another. But you notice that the periosteal casing is not so complete as before. It is interrupted at two points, those which correspond to the greatest prominence of the overlapping fragments, and its continuity exists only over part of the circumference of the fracture. The repair of the periosteum has been incomplete. It is lacking at those points where the separation between the edges of this torn membrane was too great, or where there was interposition between these edges of one of the fragments. You understand from this how inexact it was to say, with Duhamel, that in every case there was a complete periosteal ferrule which, by its ulterior transformations and its interfragmentary prolongations, formed the whole callus. The truth is that the periosteum contributes to a certain extent to the formation of the callus, to a very great extent when it has not been torn at all, or when, having been torn, the edges of the tear have been brought together by the exact setting of the fragments, but to a much less extent when the torn edges have been separated by a great interval, or by the interposition of overlapping fragments. I am now going to show you that nature has other resources than the periosteum, and that the repair of broken bones must not be attributed to this membrane alone.

2d period.—Look at these four femurs (still those of guinea-pigs), which were fractured ten, twelve, fifteen, and twenty days ago.

I. Of not one of them have the fragments remained end to end, as happens when the experiment is made upon a dog, and when immobility has been obtained by means of some apparatus. Here I was not able to keep on any apparatus, on account of the disposition and smallness of the limbs, and the vivacity of the animals. Therefore, in order to describe to you that which takes place when the fragments are brought end to end, I am forced to refer to what I have observed upon dogs in which I have obtained this result, and to the reports of other experimenters who have observed facts of this kind.

In such cases, we find at this period, quite a thick capsule, adherent to, and enveloping the two fragments. This capsule appears to be formed by the periosteum; but it is doubled externally by a muscular layer which adheres closely to it, and which you will soon verify upon our overlapping fragments. The union is so close, that we may believe that the deep muscular layer has taken part in the formation of this external callus. This capsule, which we shall therefore name *musculo-periosteal*, is much more dense than the former ones; it adheres closely to the fragments, has a grayish appearance on section, and when examined under the microscope, shows cartilaginous cells. In the earlier cases it was the fibro-cellular callus, now it is the fibro-cartilaginous callus. On section, we see a certain number of orifices, through which the blood oozes, and which belong, some to the natural vessels of the membrane, others to vessels of new formation. Here and there can be already seen a few calcareous spots scattered through the thickness of the fibro-cartilage, and which are the first points of ossification of the latter.

I do not wish to dwell too long upon the intimate mechanism of the transformations which have taken place; that of the plastic lymph into a cellular, or connective substance for the new portion of periosteum; that which brings about the thickening of the old periosteum; then the invasion of the fibrous tissue by the fibro-cartilage, and the bony deposits in the latter. Nor do I wish to discuss the question whether, instead of a transformation of the primitive elements into others, there has not rather been a substitution, that is, a successive replacement of elements and tissues by others. For these questions are still under discussion, on account of the difficulty of settling them by histological examination, and, furthermore, these studies have no very direct clinical application. I will remind you only, in order to enable you to understand these controversies, and their degree of utility, that, at the beginning of the repair, and thickening of the periosteum, we find in the organic gangue, rounded nucleated cells, similar to those which precede the formation of our normal tissues. For the French school, represented by M. Chas. Robin, these primitive cells are formed in the exuded lymph, which we compared to a blastema. For the German school, represented by Virchow, they come by proliferation from the cells of the torn tissue. It makes but little difference to me whether you adopt the one or the other of these theories, I have no unanswerable arguments for either;

but I believe that the French opinion is better supported by observation than is the German.

A little later we find fibres of connective tissue, then cartilaginous cells, and here again I am unable to say if these are transformed primordial cells, or if, as M. Robin[1] claims, the fibres have grown beside and in the place of the latter, that is, by a substitution instead of a transformation. As to the deposits of calcareous molecules, soon supplied with thin bone, corpuscules, and vessels analogous to those of Clopton Havers, no one is able to say how they are formed; quite recently they have advanced the theory, without, however, being able to prove it, that the corpuscules, or osteoplastes, were the result of a calcareous infiltration of the primitive cells which I have just mentioned. As for myself, I can suggest nothing else by way of explanation, than a tendency, a nisus, analogous to that which must be admitted for the primitive formation of the bones. This nisus exists in the points of our organism where the skeleton is to form, and it still exists in those where, a longer or shorter time after its formation, a solution of continuity occurs.

But, thus far, I have spoken to you only of the periosteum; let us now see what has taken place (when the fragments are end to end), in the other parts of the fracture, in the medullary substance, and the compact tissue of the fragments themselves.

As for the medullary substance, as it is not well marked in these small animals, I can show you only the anatomical modifications which have been observed in the large animals, and even in the human race. However, after separation of the fragments, and comparing the interior of the canal with that of the other side which is healthy, you see in the centre of the bone a gray coloration, a greater density of the contained substance, and a diminution of the fatty aspect. It is evident that the marrow has been modified in its texture, and I do not think that I overstep the limits of permissible hypothesis in telling you that this marrow has been inflamed like the periosteum. There has been medullitis at the same time with periostitis. This inflammation has likewise given birth to plastic lymph, and this has been replaced by a fibro-cellular substance at the same time that the fat has been absorbed. It is even possible that cartilaginous cells have already appeared here. Thus far, I have not found any; but, as every one admits that the medullary substance becomes cartilaginous, and then bony in the process of consolidation, I suppose that the cartilage would soon have been developed, if it is not so already. We have then here what the authors have named the internal ferrule, or the beginning of that part of the process of repair which is performed by the medullary substance. But, the work is not so far advanced as it is on the side of the periosteum.

Now look at the end of the fragments. In the inter-fragmentary space there is no appearance of consolidation; we find there only a little blood, or, rather, sanguinolent serosity, and if it were not for the thickened periosteum and marrow, we could easily separate them

[1] Dictionnaire de Médecine et de Chirurgie, par Littré et Robin (13th edition), Art. Cal.

from one another. Still the compact tissue of the extremity of the fragments is red; if we detach the periosteum for a certain distance above and below, we find the compact tissue pink and its vascular canaliculi enlarged. We have then here the anatomical characteristics of non-suppurating osteitis of the compact tissue. I give the name *plastic* to that osteitis under the influence of which the exudation destined to repair is poured out, by opposition to the osteitis in which there is formation of pus with or without a concomitant reparatory process.

The anatomical modifications of this period in a fracture set end to end may then be resumed in this: periosteum thick, fibro-cartilaginous, with beginning of ossification; marrow dense, fibro-cellular, soon becoming cartilaginous, but without bony deposit; no sign of interfragmentary callus; osteitis on the surface and in the thickness of the compact tissue of the fragments. In a word, repair by means of the periosteum and the muscles more advanced than repair by the other tissues.

II. We have now to see what has taken place in this second period (from the eighth to the fifteenth day) in overriding fractures. You still find here the fibro-cartilaginous condition of the periosteum and the deep muscular layer, with beginning of ossification. But as the periosteal capsule is incomplete that part of the work of repair which is performed by this capsule is necessarily less solid than in the preceding case. As to the marrow, it is grayish and thick as when the fragments are end to end; but that of the upper and that of the lower fragments no longer correspond on account of the overriding; consequently this thickening of the medullary substance does not help the consolidation. But between the fragments there is a fibro-cellular, partly cartilaginous substance which aids in keeping them together. This is the beginning of an interfragmentary callus. But it is furnished exclusively neither by the marrow nor by the compact tissue; it evidently has its origin in all the surfaces which are brought into contact with one another by the overlapping. Such are the outer face of the periosteum and a part of the compact edge of the fragments. There, in a word, we must not seek circular repair in the periosteum nor in the interfragmentary compact tissue, still less in the marrow which contributes nothing to it since its two divided surfaces are removed from one another. A mixed lateral interfragmentary callus is produced, the materials of which are formed by the muscles and by the outer surface of the periosteum, without its being possible to prove that this latter is thickened and transformed, and without our being able to admit anything else than the effusion from it, as well as from the surrounding cellular and muscular tissues, of plastic juices which are ultimately transformed. But we must not expect to find regularity of the phenomena which we observed in the end-to-end fractures, and which the authors have erroneously indicated as occurring indiscriminately in all fractures.

3d period.—During the third period, which lasts from the fortieth to the sixtieth day, new anatomical modifications ensue in the fibro-cartilaginous substance which was formed during the second. The

most important is the formation of the bony substance, that is, the deposit of calcareous matter, and the more abundant deposit of osteoplastes or bone corpuscles. As for these latter, we may again ask ourselves if they are the result of a transformation of the cartilaginous cells or of a substitution. This is a point which histological observation has not been able to clear up, and upon which only suppositions are permissible. You know that I lean toward the theory of substitution.

Let us see what observation has taught us concerning the succession of the phenomena in the different portions of the fracture; and here let us distinguish again between an end-to-end and an overlapping fracture. The observations have always been made upon the end-to-end fracture only. They have formed what I show you here upon this guinea-pig's femur, the lesion of which has reached the sixtieth day; a very large external bony ferrule; a bony mass, a sort of internal ferrule, within the medullary canal, but an intermediate substance between the fragments which is not yet quite ossified, and the greater part of which remains fibro-cartilaginous. In other words, you see here what Dupuytren described under the name *provisional callus*, and Miescher under the name *primitive callus*. By these names these authors wished to indicate that the periosteal and medullary portions of the bony callus were destined in great part to disappear by absorption, and that the true callus was formed by what was left of these and by the bony substance which ultimately formed between the fragments. But there was an exaggeration on the part of these surgeons in the expression of their thought in this way, first, that all is not provisional in the periosteal and medullary calluses, since a part is to remain; and secondly that, as I shall presently explain, the theory given by them as a general one, is not applicable to overriding fractures.

I ask you to notice, in passing, upon this human tibia, in which chance has permitted us to study a callus at the sixty-fifth day, that at the level of, above, and below the fracture, which is not an overlapping one, the compact tissue has become very vascular, very dense, and enlarged; that it offers, in short, the characteristics ascribed by Gerdy to condensing osteitis. When I shall study the clinical phenomena of fractures in detail I shall recur to this habitual intervention of hyperostosis after fractures of the long bones. But here, while studying the question anatomically, I am justified in telling you that the work of consolidation of fractures is dependent upon a modification of the vitality of the fragments which we can ascribe to nothing else than osteitis, and that the variety of osteitis which here intervenes is that which Gerdy named *condensing osteitis*. I go even further. In diaphysary fractures of long bones the intervention of this condensing form of osteitis seems to be necessary. When there is lack of consolidation and pseudarthrosis, rarefying osteitis has intervened. Fortunately that is much more rare, and that is why we so rarely see pseudarthrosis follow simple fracture of the shaft of long bones.

Now let us look at overlapping fractures. We have here an

example in the femur of a guinea-pig. I have sawn it longitudinally, and you can see that the new ossification, or, if you prefer, the calcification and production of osteoplastes, have taken place between the two bony surfaces in contact, there where the fibro-cartilaginous callus already existed, but that there is no mention to be made here of a medullary bony callus. It is true that the marrow at the line of the fracture is in great part ossified. But you see that this ossification is of no use to the callus and does not contribute to the consolidation, since that of the upper and that of the lower fragment are not in continuity as they were in the end-to-end fracture.

Nor is there any question of an interfragmentary callus formed by the compact tissue. Consequently, we have no longer to speak of provisional callus and definitive callus. Say, if you please, that the lateral interfragmentary callus is perhaps larger to day than it would have been six or eight months hence. But do not think that Dupuytren's and Miescher's ideas are applicable to cases of this kind, which are the most frequent in man. I have also to point out the same hyperostosis consecutive to the condensing osteitis, as that of which I spoke in end-to-end fractures.

4th period.—For the fourth period, which extends from the sixtieth to the one hundred and twentieth day, and sometimes beyond, I have but few anatomical details to point out: the callus becomes denser and diminishes in size, the medullary canal generally remains filled by the interior ossification, and the shaft of the bone remains a little larger than is normal.

I have further to mention lesions which I can show you only imperfectly in animals, and of which I have at this moment no specimen belonging to man. But we often notice the consequences in the living. I refer to—

1st. Obliteration of the veins;

2d. Synovitis of neighbouring tendons and articulations;

3d. Muscular atrophy.

1st. Obliteration of the large veins near the fracture is quite a common lesion. Are we to explain it by a phlebitis due to the propagation to the interior of the veins of the phlegmasia which arises at the point of fracture, or is it due to simple coagulation of the blood without preceding inflammation of the internal membrane of the vens? The pathological anatomists are still discussing these two theories. As for myself, I hold the first opinion. In most cases, and especially in those in which this lesion occurs in the course of a fracture, I attribute the coagulation of the blood in the veins to a phlebitis by propagation. I even ask myself (but I shall never be able to answer the question by positive facts) if this phlebitis is not due to the passage into the large veins of irritating materials coming from the inflamed marrow or osteomyelitis. But, leaving aside the theoretical question, I point out to you this spontaneous coagulation and the resultant obliteration as the cause of a complication which is not dangerous, but is troublesome and lasts a long time, œdema of the limb about and below the point of fracture.

2d. Synovitis of the tendons and joints is not so frequent in frac-

tures of the shaft as in those of the extremities of the long bones. Nevertheless, after one of the former you often see one of the neighbouring joints inflame and preserve for a long time a more or less painful rigidity, which is explained by the loss of extensibility and of suppleness of the synovial membrane and the connective tissue which lines it. This is particularly common in the knee after fracture of the shaft of the femur, and in the ankle-joint after fracture of the leg.

3d. The muscular atrophy consecutive to fractures which I have studied for several years, and which I made known in a thesis of Dr. Lejeune[1] based upon my lectures at the Hôpital Cochin, and a little later in my work upon *irreductibility and the consecutive deformities of long bones*,[2] is a phenomenon, if not constant, at least very frequent. We often see examples in living patients. The diminution in size of the limbs, the diminution of strength, are easily recognized. In three guinea-pigs whose muscles I here show you, this lesion is very evident. The muscles of the thigh which was broken a few months ago are a little paler and smaller than those of the opposite side. I weighed the muscles of the thighs of one of the animals and found on the healthy side 142 grains, and on the fractured one 117.

Dr. Lejeune weighed separately the muscles of both limbs of a patient who died at the Hôpital Cochin, and found a notable difference in each one.

According to these results, you may consider it an incontestable fact that the muscles diminish in size after a fracture, and I have ascertained that this diminution is permanent, and not temporary.

I have sought[3] for what might be the cause of this slight atrophy, and reached this conclusion, that it should be attributed neither to the compression nor to the immobility, and that it was doubtless due to a change in the distribution of the nutritive materials which is the consequence of the process of consolidation. Not only does the fracture draw towards itself a greater quantity of these materials, but the callus itself, when once formed, and after its completion the hyperostosis, require a greater proportion for their nourishment. This seems to me to be proved by the difference in weight between the fractured and the opposite healthy bone of the same subject. For example, look at these two femurs of a guinea-pig. The right, which was broken forty-three days ago and which is consolidated, weighs 19.8 grains, the left, 15.75 grains. Is it not probable that the right has taken, and would have continued to take, if the animal had lived, more material from the blood, and that consequently there would have been less left for the muscles?

Whatever may be the explanation, the anatomical fact exists and accounts for the persistent weakness so long complained of by patients in limbs which have been broken. I admit that in many patients the diminution of strength is not great, and is scarcely

[1] Lejeune, Thèses de Paris, 1858.

[2] Gosselin, Mémoire sur l'Irréductibilité et les Déformations consecutives des Os longs. (Gaz. Hebdomadaire de Méd. et de Chirurgie, Paris 1859.)

[3] Gosselin, loc. cit.

appreciable. That is because the innervation is not affected, and the muscles receive from the nerves a stimulus sufficient to diminish the physiological results of the atrophy. It is no longer the same when the nerves have been wounded at the same time as the bone. There may then be paralysis as well as atrophy, and the functional troubles are much more marked.

§ 2. Phenomena of Consolidation in the Extremities of Long Bones.

In the extremities of long bones, as in their shafts, we have a first period, called inflammatory, during which the blood and the plastic lymph are effused between the fragments, and at the same time the adjoining connective tissue is swollen for a certain distance above and below the solution of continuity. The beginning of consolidation has not been so well studied here as upon the shaft, for the fractures are so difficult to produce, that experimental study has not been possible, and on the other hand, occasions upon men are rare. We know, however, that the fragments are almost never entirely separated from each other, and that consequently we have not to make a separate study for the end-to-end and for the overlapping fractures. They are almost always end to end, with a more or less marked displacement according to thickness and sometimes according to direction. On the other hand, there is no medullary cavity, and consequently no internal ferrule. The repair is periosteal and interfragmentary, and in this first period, the solution of continuity of the periosteum begins its repair at all the points where its borders are a little separated. But in general the periosteum does not thicken as much as it does on the shaft, and does not form from the beginning this thick ferrule of which we have spoken. No consolidation yet takes place between the fragments; we find there only extravasated blood.

During the second period the new periosteal portion becomes fibro-cartilaginous. At the same time the interfragmentary consolidation commences by the production, probably through the transformation of the exuded lymph, of a fibro-cartilaginous substance. But here several varieties must be pointed out.

In the first, the fragments, composed almost exclusively of cancellous tissue, have not been crushed; they offer neither the reciprocal penetration so well described by M. Voillemier[1] for fracture of the lower extremity of the radius, nor the reduction into small fragments, sometimes into dust, of a portion of this bony tissue which is broken by the mechanism of crushing. In such cases the blood is absorbed, and the fibro-cartilaginous substance, the beginning of the interfragmentary callus, is formed.

In a second variety, which is often found in fractures of the lower extremity of the radius the pieces are in contact, but are reduced by crushing into a certain number of fragments, some of which are very small, almost pulverized. In such cases, especially when there is penetration, the work of consolidation is preceded by the absorption

[1] Voillemier, Clinique Chirurgicale, Paris, 1861.

of a part or of the whole of the fragmentary portions. Nothing in the clinical symptoms indicates this absorption, but as, after fractures long consolidated, we find a shortening which cannot be explained by overriding, and which we can attribute only to this absorption, I presume that it takes place during the first few days at the same time as that of the blood infiltrated between the fragments.

In a third variety, of which the intra-capsular fractures of the neck of the femur and of the humerus give us quite frequent examples, the fragments are in contact but do not penetrate one another; the interposed blood is reabsorbed, and so too is the bone dust. But no intermediate fibro-cartilage is produced, and this absence of the first rudiments of a callus is the indication of non-consolidation which has been pointed out by all the modern authors as frequent in fractures of this kind.

To what cause must we attribute this unfortunate result? It has been claimed to be due to the shortness of the upper fragment, the insufficiency of vessels, and therefore of nutritive materials, in this fragment, and consequently the necessity for the lower fragment to do the whole work of repair, a task which it is unable to perform properly.

I would here say that if this were the only cause, or even the principal one, all fractures of the extremities would be exposed to non-consolidation. Now some of these, those of the lower extremity of the radius for example, consolidate very well.

In those which consolidate rarely I see the intervention of a condition which ought in great part to explain it; I refer to the free communication between the seat of the lesion and the articular cavity, such as exists in intra-capsular fractures of the neck of the femur. I suppose that, as it has been claimed for fractures of the patella, the blood and plastic lymph flow into the articulation, and not enough of the latter remains between the fragments to ultimately produce the fibro-cartilaginous substance.

In the third period, absorption of the pieces goes on if the conditions of the fracture are favourable thereto; the periosteal callus ossifies without becoming thick enough to form a ferrule comparable to that of fracture of the shaft. The interfragmentary callus is completed and assumes a greater and greater importance through the ossification of the fibro-cartilaginous substance, according to the same mechanism, and in the same mysterious conditions which I indicated above. This intermediary callus is often very thick and very resisting, especially at the lower extremity of the radius; but sometimes, and in particular at the neck of the femur, it remains fibrous and more or less dense, almost always dense enough to allow the patient to walk with crutches without inflection or rupture of the callus.

In any case, the capital difference to which I wish to call attention between the callus of the shaft and that of the extremities is that, at the beginning, the former is much more peripheral than interfragmentary; that if it is interfragmentary in overlapping fractures, it is at the same time lateral and periosteal; while the second is interfragmentary in the most rigorous sense of the word, that is, it is formed

in great part or in totality by the spongy tissue through which the solution of continuity was made. And the result of this comparative study is to show that all the constituent parts of the bone, spongy tissue, compact tissue, periosteum, contribute to repair fractures of the bone, that even the layers of muscular tissue and the surrounding cellular tissue contribute also to it, and that, finally, the authors erroneously attributed a much too large part to the periosteum in this reparatory function Furthermore, the same conclusion will be drawn from the study of the consolidation of simple fractures of flat bones and short bones.

In the fourth period, the patients are tormented by the consequences of articular and tendinous synovites, and so much the more so because these fractures being near a joint or synovial grooves, and often even in communication with them, the inflammation has spread to the latter and left behind it the dryness and stiffness which in the joints, characterize plastic chronic arthritis and dry arthritis. These consequences are so much the more marked and rebellious because the patients affected with these lesions of the extremities are almost always advanced in age, for the predisposing cause of fracture with crushing is rarefaction of the cancellous tissue, rarefaction which, in consequence of inexplicable modifications of nutrition, is a very common consequence of age. Now it is also the case that in old people traumatic arthritis and synovitis, although they do not go on to suppuration, are very slow to end and often pass to that condition of incurability which causes dry arthritis. Finally, muscular atrophy occurs after these fractures as well as after those of the shaft.

§ 3. Anatomical Phenomena in Fractures of the Flat Bones and Short Bones.

I have not much to say on this subject; nature uses the same resources in the consolidation of these two kinds of bone as in that of long bones. The muscles, the periosteum, and the whole fractured surface furnish the materials, and the same ulterior modifications of these materials cause the formation of the callus. But in the flat bones, and especially in those which have no diploë, or only a very thin one, the periosteum is the chief agent where it has been preserved, and it must not be forgotten that if it has been divided, which very commonly happens, it begins by repairing itself, and the material which it supplies to the callus comes as much from its cicatricial portion as from that which remained intact about the fracture. Further, no matter how thin the bone may be at the place of fracture, it can still furnish the materials needed for repair. I had occasion, in 1871, to trepan for intra-cranial suppuration following gunshot fracture of the right parietal bone, a young man twenty-four years old, who was employed in the museum of natural history, and had been brought to the ambulance of that establishment after the battle of Buzenval, where he had been wounded. Not only did he survive the operation, but a bony growth formed all around the opening and advanced towards the centre, so that this sort of flattened callus

closed entirely the hole made by the crown of the trepan. Larrey has reported similar cases, in which, as in mine, the calluses were formed during suppurative osteitis, but I wish to mention them here in order to show you once more the power and the multiplicity of means which the organism possesses to repair not only solutions of continuity but also losses of substance in the bone.

LECTURE X.

PHENOMENA OF CONSOLIDATION AFTER COMPOUND SUPPURATING FRACTURES.

1st Variety: Consolidation after benign and superficial suppurating osteitis. 2d Variety: Consolidation after deep osteitis or non-putrid suppurative osteo-myelitis. 3d Variety: Death before consolidation by putrid osteo-myelitis and purulent infection.

GENTLEMEN: Do not lose sight of a first point which is capital in the history of fractures complicated by wounds; they may get well, exactly like simple fractures, but on one condition, which you should always bear in mind when you are called upon to treat such a case, on condition, I repeat, that the bone does not suppurate.

When the broken bone suppurates, and unfortunately all the efforts which you have made and should have made to prevent it do not always succeed, the clinical and anatomical phenomena of consolidation are peculiarly modified, sometimes hindered by this new complication which I shall study especially in the long bones.

Moreover, we have differences depending upon whether the suppurating osteitis occupies the superficies or the entire thickness of the bone, and according to its greater or less intensity. Let me explain these two points.

1. In a first variety, which I call *benign and superficial suppurating osteitis*, the patient has no general symptoms and consequently no fever. The swelling of the limb is moderate, suppuration is established the fourth or the fifth day in the wound itself. The eschars begin to be eliminated, and if you probe the wound gently, you feel the bone denuded superficially. Suppuration becomes a little more abundant after the eighth or ninth day, but the pus is laudable, not fetid, and the apyrexia continues. Things go on in this way for twenty or thirty days; the suppuration continues rather scanty, with no burrowing of the pus, no indication of a deep collection. Mobility of the fragments begins to diminish; in short, except for the superficial suppuration and denudation, the fracture resembles a simple one that has reached this period. But the denudation continues and the fracture goes on to the sixtieth, sixty-fifth day; about the seventieth

day we find it consolidated. Increase of volume can be felt above and below, showing that the osteitis on both sides of the fracture has taken on the condensing form with which we are acquainted. But the fistula persists and the suppuration which it supplies only ends twenty, thirty, or forty days later, after elimination of a splinter or mortified piece comprising a more or less considerable portion of the thickness of the bone. To use the ordinary terms, there has been superficial necrosis, and, after expulsion of the necrosed part, the callus and cicatrix have been completed. The osteitis, instead of remaining plastic over the whole fracture, became suppurative and necrotic in one place, hence the anatomical phenomena which have taken place. In the deep parts of the bone, that is to say, between the fragments, in the medullary canal, and at that portion of the circumference of the bone which is opposite that with which the wound communicates, the osteitis has been plastic, that is, non-suppurative, and the callus has been formed, as in ordinary cases, by effusion and ultimate transformation of the lymph. Adjoining the wound the periosteum has been destroyed by absorption or by mortification; part of the bone has necrosed. Suppuration has taken place about the necrosis without extending to the interfragmentary space. After expulsion of the sequestrum, the suppurating granulations have covered the surface of the bone, and it is in them that have taken place the ulterior transformations, that is, into fibro-cartilage, and then into bone, which have brought about both the reproduction of the periosteum at this point, and the reproduction, sometimes excessive, of the subjacent layer of bone. Here then you see a new element intervene in the formation of the callus, an element which is itself a product of the consecutive inflammation; the granulations, which whilst they suppurate on the surface, ossify below and are transformed into a bone cicatrix, just as they are transformed upon the skin and subjacent tissues, when there is suppuration, into nodular fibrous tissue. The intervention of this new element shows you once more how many assistants the periosteum needs in order that the callus may form under all the conditions where its production becomes necessary.

2. In a second variety, suppuration invades the surface and the depths of the bone, that is to say, the interfragmentary space, the medullary canal, and that portion of the circumference which is furthest from the wound. The osteitis, in a word, has become a general suppurative one, and is no longer partially suppurative as in the other variety. This is the form which we call suppurative osteo-myelitis, so as to indicate also the participation of the marrow.

At first the clinical phenomena vary according to the intensity of this osteo-myelitis. If this is moderate, if the osteitis is subacute, the primitive or traumatic fever is not very violent; the pulse does not go beyond 100, 110, nor the temperature in the axilla above 101° to 102°; you do not see the subicteric tint, the delirium, the dryness of the tongue, the tympanism of the abdomen, which announces the dangerous form of traumatic fever. Suppuration begins on the fifth or sixth day in the wound; the pus burrows in the neighbouring

tissues. Through the wound and the new openings made by the suppuration, the probe, and sometimes the finger, show that the bone is denuded to a considerable extent above and below the fracture, both about the wound and on the opposite side. The probe penetrates deeply between the fragments and brings out pus. If in order to dress it, you are obliged to move the limb, you see at each movement the liquid escape from the deep parts; furthermore, the suppuration is very abundant. These are so many indications of the presence of suppuration in the depths of the bone, and consequently in the medullary canal.

The case goes on thus for weeks and months unless complications, particularly erysipelas or purulent infection, should intervene. Suppuration continues to be abundant, from time to time slivers of bone are eliminated, the fragments remain movable, repair does not go on, and yet the tumefaction of the bone above and below the fracture indicates that there the osteitis has become condensing, a circumstance which generally augurs well, because, in cases of this kind, the osteitis is reparatory at the same time that it is condensing, that is, the nisus which increases the size of the bone above and below the fracture tends also to repair it.

Finally after a length of time which varies from three to six months, a large callus exists at the seat of the original lesion of the bone. There are still superficial slivers of bone, others, surrounded by new bone, are invaginated; more or less numerous fistulæ lead to these sequestra. In short, the suppurating osteitis has at the same time been hypertrophying and necrotic, as is generally the case in acute suppurating osteitis of youth, and finally, the fracture is really replaced by necrosis consecutive to this osteitis.

How is this callus produced? Very probably by the two mechanisms which we already know; in spite of the intensity and abundance of the suppuration there are perhaps here and there a few points where it has not taken place, and where the plastic exudation has been deposited either by the muscles or by the portions of bone furthest removed from the wound. But in addition, at those points where suppuration takes place without necrosis and elimination, the callus is formed by the granulations themselves, as Sabatier formerly pointed out, and as well by those of the medullary canal and compact tissue as by those of the periosteum. Another proof in support of the opinion that the periosteum is far from being the only agent in the formation of the callus.

3. In a third variety, the osteo-myelitis becomes as intense as possible; it is hyperacute, gives rise to traumatic fever of the most dangerous kind, and is followed, if life is prolonged, by putrefaction of the marrow and periosteum which becomes the point of departure of that other fever which we call purulent infection. But I do not wish to treat to day of putrid osteo-myelitis. I only wish to point it out to you, placing it beside the other forms of suppurating osteitis and the mode of consolidation after their appearance.

LECTURE XI.

FRACTURES OF THE LEG.

Fracture by indirect action at the junction of the middle with the lower third of the leg—Examinations made to recognize it—No appreciable displacement. 1st Variety, Clinical—Mobility, Crepitation—The fracture occupies both bones—Search for the direction—Explanation of the absence of displacement. 2d Variety, Clinical—Indirect fracture with transverse displacement—Examination of these three questions—Why this displacement?—Is it reducible and easily maintained?—What is the cause of the phlyctenæ, and what will they become?—Treatment with the wire splint—Description of Scultet's apparatus, mechanical beds, water bed.

GENTLEMEN: I. You have just seen in No. 5, a man 32 years old, of habitually good health, who fell yesterday evening in the street, was unable to rise, and was brought to the hospital on a stretcher. He was put to bed and his left leg placed in a wire trough extending a little above the knee. The patient suffered during most of the night, and has slept but little; this morning we find him in the following condition:—

The left leg, compared with the right, is notably larger, without showing either phlyctenæ or redness. Pressing with one finger upon the inner face of the tibia we feel only a little thickening; there is neither ecchymosis nor phlyctenæ. The finger passed along the anterior border and inner face of the bone, finds nowhere any inequality which could be attributed to a displaced fragment. Pressure with this finger causes pain only at the junction of the middle with the lower third of the leg. This pain on pressure in a fixed point, the suffering experienced during the night, the extensive though moderate swelling, taken together with the difficulty of moving the limb, and the patient's inability to get up and walk, are the rational signs of fracture. But you saw that by raising the limb with my two hands, one of which embraced its middle, the other its lower third, and by trying to move the lower part of the limb alternately outwards and inwards with the hand which held it, while the other held the upper two-thirds firmly, I produced an abnormal movement, the centre of which was at the lower part of the shaft of the tibia. I thus demonstrated mobility, and during the same manœuvre I also felt crepitation. We have then no doubt upon the first point of the diagnosis. The patient has a fracture.

But is it only a fracture of the tibia, or are both the bones broken? It is again the mobility which enables us to answer this question. If the tibia alone had been fractured, I should have been able to impress only very obscure movements which would have left me in doubt; to establish my diagnosis I should have had to insist upon the pain

on pressure, and to renew the examination for several successive days. I should undoubtedly, after several days, when the swelling and the muscular contractions had diminished, have ended by finding a sufficiently appreciable mobility; perhaps also one day or another, during these examinations, I might have found crepitation. But when the very first day you find a mobility so marked that the hands of the surgeon appreciate it very easily, and that even the assistants can see it, there is no hesitation; it is a simultaneous fracture of the tibia and fibula.

Can I now tell you what is the direction of this fracture, if not in both bones, at least in the more accessible one, and to what anatomo-pathological conditions the absence of displacement is due? Upon these points I am obliged to maintain the greatest reserve. Before Malgaigne's publications we might have thought that it was a transverse fracture; but since Malgaigne[1] has shown positively that fractures of this kind, especially in adults, do not exist, and that the cases which were supposed to be such were toothed fractures, we may believe that we are in presence of a fracture of this kind, and that the non-displacement is explained by the preservation and interlocking of these irregularities. It is probable at the same time that the periosteum and attachments of the muscles are preserved upon a part of the contour of the solution of continuity, and aid to keep the fragments together.

However that may be, you are in presence of the most favourable clinical variety. The patient will get well without deformity, and in all probability will get well rapidly. At least we foresee no circumstance which would retard consolidation.

II. Not far from this patient is another, at No. 15, who was admitted three days ago, and who presents an example of the second clinical variety of fracture of the leg.

He fell, like the preceding one, and was not able to get up or walk. It was the left leg which was injured. The functional and physical symptoms are the same. But in addition, by passing the finger along the anterior border of the tibia we felt at the lower part of the inferior third an abnormal projection which raised and distended the skin and was painful on pressure. Furthermore, there were two quite large phlyctenæ, one of which was filled with yellowish serosity, and the other with sanguinolent serosity, and a few smaller ones. Let us consider for a moment these two particularities.

1st. What is this abnormal projection? It is evidently formed by the upper fragment of the tibia, and is due to the fact that this fragment, pushed forward by the impulsion which was communicated to it at the moment of the accident, is at the same time drawn up and held by the traction of the quadriceps femoris upon the point where the ligamentum patella is attached. This displacement, the most frequent of those which you will see in fractures of the leg, belongs to the category of transverse displacements. When you meet with it, you will ask yourselves two questions: one theoretical, To what is it due? the other essentially practical, Is it reducible?

[1] Malgaigne, Traité des Fractures, p 66.

To what is it due? I told you a moment ago that it was due to an impulsion forwards by the cause of the injury, and to the action of the quadriceps femoris. But the anatomical condition which really explains it is the principal direction of the line of fracture. This direction, instead of being nearly horizontal as in the preceding case, represents an oblique direction downwards and forwards, a section so disposed that the upper fragment terminates in a more or less pointed extremity. This disposition has received the name of oblique fracture, and you understand that it is very favourable for the displacement which we see here. It is sufficient that at the time of the accident an impulsion be communicated to this fragment, so that, drawn up by the action of the quadriceps, it forms the projection which you saw.

Are there not, also, in the manner in which the fracture is produced, in its mechanism, as they say, reasons which explain the displacement? I do not think so, or at least if the reasons exist, they escape us entirely. For I learn from the information given by the patient that, as in the preceding case, the fracture was produced without the intervention of any more or less heavy vulnerant body. It is not then a fracture by direct action, but by indirect action. But in fractures of this kind which we are unable, on account of the resistance of the tibia, to reproduce upon the cadaver, the solution of continuity is the result both of irregular muscular actions, some of which tend to give the bone an unusual curve, and the others to twist it, and the pressure of the weight of the body upon this bone, already a little bent and twisted. But it is impossible for us to analyze strictly the muscular phenomena which are produced at the moment of the fall; and as it is also impossible to study them by experiments upon the cadaver and upon living animals, I am unable to tell you how and why, in consequence of this complex intervention of muscular action and the weight of the body, there is obliquity of the fracture and propulsion forwards of the upper fragment of the tibia.

Content yourselves, then, with knowing and remembering this capital fact; the most frequent displacement in fractures of the leg is the one you see here, a transverse displacement in which the extremity of the upper fragment projects forwards.

Let us now consider the practical question: Can this displacement be reduced, and will it be possible for us to keep it reduced, so that the patient may get well without a deformity due to the persistence of a transverse displacement? This problem is in great part solved for this patient. For yesterday I reduced the displacement in the following manner: I raised the leg from the wire splint in which it had been placed the evening before. With one hand I held the upper fragment; with the other, grasping the two malleoli, I drew them downwards, exerting what, in classical language, is called extension. As I felt a little resistance I asked an assistant standing at the end of the bed to help me make extension, grasping the instep with one hand, with the fingers upon the dorsum and the thumb upon the sole of the foot, and the calcaneum with the other. I asked him to

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would go away by iron, tonics, and cold baths." Here we have illustrations of gleet terminating in stricture.

Now it is well for you, once for all, to understand that a gleet is not a disorder which is disposed to go away of itself; on the contrary, it requires careful and well considered treatment, and if it does not receive this—that is to say, if it is clumsily dealt with or not dealt with at all—it most probably ends in the formation of a stricture.

A gleet is to be regarded as indicative of the early formation of stricture. Nay, further, you will not do wrongly in regarding a gleet as the stage in the stricture-forming process when by your treatment you can promise your patient to restore his urethra to its normal condition; when a stricture is once allowed to become cicatricial in its character, you may palliate or adapt, but you can no more *restore* his urethra than you can by dissection or any other process remove a scar from his skin. You may moderate the inconveniences of a scar, but you cannot obliterate it. Let not, then, the curable stage of stricture pass by; at all events, let the onus of doing so rest with your patient, and not with yourself.

Again, it is very common to hear patients attribute their strictures to the use of injections in the treatment of their gonorrhœas. A considerable amount of prejudice exists in the public mind in reference to the use of these applications. Patients not unfrequently say, when consulting you about a gonorrhœa, "Do not order me an injection, as I understand they often occasion stricture." Is there any truth in such an allegation? Assuredly not, presuming, of course, injections are judiciously prescribed and properly used.

Let me remind you that the cure of gonorrhœa by specifics is essentially one on the principal of injection. For how do the drugs that act specifically on the urethra effect their purpose? How do we explain the action of copaiba, oil of sandal-wood, creasote, and certain terebinthinates, in the cure of gonorrhœa? Do not all these drugs exercise their therapeutic properties, by certain of their constituents, for the most part demonstrable, being conveyed by the urine to the situation of the disorder? What is this but a cure by injection, or, to be etymologically correct, ejection? It is the urine of the patient that conveys the specific to the disease, just as the rose-water in your injection does the sulphate of zinc, or other astringents.

It is the abuse of injection that is open to animadversion. Injections in the treatment of gonorrhœa only do harm when, by reason of their composition or strength, they act as *irritants* to the mucous membrane.

In the ordering of urethral injections there are two rules which should be regarded: 1. Do not strain the urethra by the *quantity* of injection used. 2. Do not pain the urethra by the *quality* of the injection. A teaspoonful of fluid *put* into the urethra frequently is better than a tablespoonful *forced* in three times a day. This is a point upon which I have long insisted. In prescribing injections you should feel your way, adding to the strength according to circumstances. Some persons, it is well known, are far more sensitive to the action of remedies than others; and this applies equally to the urethra—"The temper of the urethra varies as much as the temper of the mind."[1] An injection appropriate in strength to a first gonorrhœa is like the proverbial drop of rain on the duck's back in the case of the *habitué*. I remember ordering one of the latter an injection well known as "the four sulphates." It cured him effectually, and without pain. A friend, hearing of the success, borrowed the prescription, and, without proper advice, used it. The consequences were, an acute attack of cystitis and a subsequent stricture. Surely it is only to the foolhardiness of the sufferer that such an unfortunate result is to be attributed.

And I would here remark that I have seen a great deal of damage done and suffering occasioned by the use of some of the nostrum injections advertised throughout the country as "infallible cures" and "preventives." Many of them contain

[1] Brodie on Diseases of the Urinary Organs, p. 50.

the ordinary astringents applicable to the urethra, but in a very potent form. I caution you therefore against sanctioning their use.

These observations have been made with the view of showing that it is only by their improper use that injections are open to the charge of occasioning stricture. If they are prescribed in accordance with the rules I have given, you will never have cause to regret their use.

[Mr. Harrison then proceeded to speak of the pathology of stricture, illustrating his remarks by cases which have recently been under treatment in the infirmary.]—*Lancet*, August 19, 1876.

HOSPITAL NOTES AND GLEANINGS.

Popliteal Aneurism cured in two hours by the application of Esmarch's Bandage.—D. M'H., labourer, æt. 29, was admitted into Manchester Royal Infirmary under the care of Mr. F. A. Heath, Oct 16. He stated that up to within three weeks of his admission he enjoyed good health. While at his work about that time he experienced a weakness and pain in the calf of his leg, and noticed a lump behind the knee, which throbbed a good deal, and gave him some pain. He had never had syphilis, but had been a pretty heavy drinker at times. On admission an aneurism, the size of a small orange, was found occupying the left popliteal space. It pulsated freely, and a distinct bruit could be heard in it. The tibial arteries at the left ankle could not be felt, but were plainly perceptible at the right ankle. The veins on the surface of the left leg were larger than those on the right, but there was no œdema of the limb. Heart-sounds perfectly healthy, and area of cardiac dulness normal.

Oct. 17. At 10.15 A. M., after the limb had been elevated to empty it of blood, Esmarch's elastic bandage was carefully applied from the toes upwards, until the lower part of the popliteal space was reached. The patient was then directed to stand up in order to allow blood to flow into the aneurism, and the bandage was then lightly passed over it, a layer of cotton-wool intervening. The roller was then applied above the knee to within three inches of Poupart's ligament, where it was secured. Temperature 98.6°; pulse 80. At 11 A. M., the patient was somewhat restless, and complained of great pain in the limb. One-third of a grain of morphia given subcutaneously. At 11.15 A. M., temperature 98.6°; pulse 90; Signoroni's tourniquet applied to the femoral artery in Scarpa's triangle, and Esmarch's bandage, having been on exactly one hour, was slowly removed; tumour felt hard, and no pulsation could be perceived in it. The leg and toes looked blue, and felt cold. The limb was enveloped in cotton-wool and flannel bandages to maintain the temperature. Pain was relieved on removal of Esmarch's bandage, and the patient appeared very cheerful. At 12.15 P. M., all pressure was taken off for a few moments, exactly two hours after the operation had been commenced. The tumour was quite hard, seemed a little smaller, and no trace of pulsation could be felt in it. A small vessel was noticed pulsating over the aneurism near to the external side; tourniquet reapplied. At 2.15 P. M., pressure was again removed for a short time; no pulsation in the tumour. At 4.15, just six hours after Esmarch's bandage was applied, the tourniquet was entirely removed, and the tumour on being examined was found to be quite hard, and free from pulsation. The patient was not in any pain. The tourniquet was applied lightly over the femoral artery, so as to control, but not to stop, the flow of blood

18*th*. 9.30 A. M.: Tumour much smaller and quite hard; no trace of pulsation to be felt in it. Limb quite warm. Three small arteries to be felt pulsating in front and at inner side of knee-joint.

19*th*. Tourniquet entirely removed. Aneurism hard and getting smaller.

Mr. Heath was led to adopt this method of treatment from the account which appeared in *The Lancet* of the 30th Sept. of the success attending a case of Mr. Wagstaffe's, and his account was followed step by step during the operation. It may fairly be assumed that the aneurism was cured at the end of the second hour, for the tumour was quite hard and free from

pulsation at the end of that time.—*Lancet*, Nov. 4, 1876.

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Peculiar Luxation of the External Extremity of the Clavicle.—The luxation of the clavicle directly backwards over the acromion is a form which is rarely seen. In neither "Malgaigne" nor the "Dictionnaire Encyclopédique des Sciences Médicales" is any mention made of it.

Michael H——, aged eighty-one, shoemaker, native of Antwerp, came to the hospital, complaining of inability to use his right arm. On the 7th September, while crossing the street, his foot slipped as he was getting on to the pavement, and he fell on to the back part of his shoulder.

At first sight the case appeared to be one of luxation of the head of the humerus forwards, several of the symptoms of that form of displacement being present. But upon closer examination it was easy to determine that the head of the humerus had not left its cavity, and that there was in reality a luxation of the clavicle, and not of the humerus.

The symptoms were briefly as follows: In front the internal extremity of the clavicle was prominent, the inferior and superior clavicular fossæ were effaced, and the distance between the middle line and the shoulder was diminished. At the shoulder the head of the humerus was found to be in its normal position. The articular surface of the acromion was found to be situated in front of the clavicle. Behind the acromion the external extremity of the clavicle could be readily distinguished. The articular surface of the latter was situated outside the acromion, and its anterior border corresponded with the posterior border of the acromial process. The head was slightly flexed, and turned towards the right. The elbow was separated from the body by a distance of ten centimetres. The spinal border of the scapula was prominent, and its inferior angle was pushed towards the spinal column. The movements of the arm were very limited, and caused much pain.

The patient was put under the influence of chloroform with the view of reducing the luxation, but this was found to be impossible; accordingly his arm was fixed in a sling.

M. Nicaise, who was doing duty at that time for M. Péan, proceeded to make some experiments upon the dead body, in order to determine the mode of production of this form of luxation. With the section of the acromio-clavicular ligament it was impossible to produce the luxation. The trapezoid ligament was then cut, and it was then found easy to produce the desired displacement. The conoid ligament was left intact. From these experiments it may be inferred that the rupture of the trapezoid ligament is necessary for the production of this form of luxation.—*Lancet*, Oct. 14, 1876.

MEDICAL NEWS.

ORIGINAL ARTICLES.

Further Report of a Case of Sanguineous Discharge from the Vagina of an Infant aged three months. By Edwin Farnham, M.D., Cambridge, Mass.—The urine of the mother of the child, Mrs. S., was examined three times, chemically and microscopically, and at no time were any evidences of renal trouble discovered.

Since the case was reported the child has developed an eruption of hereditary syphilis. On investigation of the family history it appears that about six years ago the father had a chancre and a bubo which suppurated. The mother has at no time given any indication of infection.

The infant has been weaned, and put upon a mercurial course, the drug being exhibited in the form of hydrargyrum cum creta. Under this treatment it has thriven, the eruption fading, and the child increasing in weight, though not so rapidly as before weaning. The weight (naked) when five months old (Nov. 7th, 1876) was 15 pounds.

Whether the development of such a disease as hereditary syphilis throws any light on the causation of the vaginal discharge I am unable to decide.

By a misprint it is stated in the preceding Number of the News, that the mother suffered during her pregnancy from Toxic convulsions instead of *Tonic*.

DOMESTIC INTELLIGENCE.

Johns Hopkins Hospital, Baltimore.—The trustees of this institution have been so fortunate as to obtain the services of Dr. John J. Billings, Assistant Surgeon, U. S. A., as professional adviser. This excellent appointment is another proof of the good judgment which the management has so far conspicuously displayed in the performance of their difficult task.

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International Congress of Ophthalmology.—This Congress met in New York on the 12th of September, pursuant to adjournment at London in 1872. The following officers were elected. *President*, E. Williams, M.D., of Cincinnati; *Vice-Presidents*, Mr. Brudenell Carter, of London, and Dr. E. Hansen, of Copenhagen; *Secretary*, Dr. C. S. Bull, of New York. A number of interesting papers were read before the Congress, and will appear in the volume of Transactions. A committee consisting of Mr. Carter and Drs. Hansen and Becker were appointed to designate, after consultation, the place of meeting in 1880.

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Honors to American Physicians.—Mr. William Adams, President of the Medical Society of London, inaugurated the winter session by delivering an address in which he gave a graphic and complimentary account of his visit to America as a delegate to the International Medical Congress. He concluded by proposing as corresponding fellows of the society, Drs. S. D. Gross, of Philadelphia; Austin Flint, of New York; Joseph Pancoast, of Philadelphia, and Surgeon-General Barnes, U. S. A.

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Deaths from Chloroform.—The *Ohio Medical Recorder* for October, 1876, reports a case of death from the inhalation of chloroform occurring in a young woman aged 30, to whom it was administered for the extraction of a tooth.

Another case is reported in the *Pacific Medical and Surgical Journal* for the same month. The patient was a man who resided in Madison County, Indiana, and the anæsthetic was administered for the purpose of extracting a thorn from his foot.

Dr. W. T. McNutt reports (*Pacific Med. and Surg. Journal*, July, 1875) a case of this which occurred during the reduction of dislocated shoulder joint.

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International Medical Congress.—We are requested to state that gentlemen who wish to obtain early copies of the forthcoming volume of *Transactions of the International Medical Congress*, held in Philadelphia, September 4–9, 1876, should forward their subscriptions without delay to the treasurer, Dr. Caspar Wister, 1303 Arch St., Philadelphia.

The price, to subscribers, is Six Dollars ($6 00) per copy, payable in advance; but this rate will be considerably increased upon the day of publication.

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Obituary Record.—Died in Pittsburg, Oct. 14th, 1876, of pneumonia, A. G. Walters, M.D., aged 65 years. Dr. Walters was a bold operator, and enjoyed a large practice. He was a native of Russia, and a graduate of the University of Berlin, but has resided in this country since 1836.

——— August 16, 1876, Julian S. Sherman, M.D., Professor of Orthopedic Surgery and Diseases of the Joints in the Chicago Medical College.

FOREIGN INTELLIGENCE.

Carbolic Acid as a Local Anæsthetic.—Dr. Bergonzini recommends a new painless mode of opening abscesses. It consists in placing in contact with the skin for three or five minutes a mixture formed of one part of glycerine and two parts of carbolic acid. It produces neither redness nor swelling, and may be employed with advantage in autoplastic operations, and in the treatment of superficial neuralgia.—*Med. Times and Gazette*, Oct. 21, 1876, from *Presse Méd. Belge*, Oct. 8.

The anæsthetic properties of carbolic acid were first pointed out more than four years ago by Dr. J. H. Bill, U. S. Army, in an interesting paper in the *Am. Jour. of the Medical Sciences* for July, 1872.

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Administration of Sulphate of Quinia.—Dr. Dorville prescribes from one-half to one gramme in a small glass of brandy at the commencement of the cold stage, to

arrest the paroxysm or prevent subsequent attacks. In a moderate dose the action of the quinine is rapid and energetic, and its taste so taken is not very disagreeable.—*Med. Times and Gazette*, Nov. 4, from *Union Méd.*, Oct. 19.

Poison of Non-edible Mushrooms.—Dr. Schiff has demonstrated that these have a common poison, muscarina, and that its effects are counteracted by both atropia and daturia.

Experiments on Filtration.—Mr. J. A. Wanklyn states that on continuing his experiments on the action of "Silicated carbon" filters, he has obtained results beyond his most sanguine expectations.

A solution of sulphate of quinine of such a strength that one gallon contained 8.26 grains of soluble sulphate of quinine ($C_{20}H_{24}N_2O_2H_2SO_4,6H_2O$) was completely deprived of quinine by one single filtration through six inches of filter.

The liquid before filtration yielded 3.55 milligrammes of albuminoid ammonia per litre, and after filtration 0.02 milligrammes of albuminoid ammonia per litre.

A solution of the above strength is sensibly bitter to the taste, and after filtration is no longer bitter.

Chemists will thus perceive that the silicated carbon filter is endowed with extraordinary powers.

That carbon has some power in absorbing alkaloids has been known for years (*vide* Watts's Dictionary); but that it absorbs alkaloids absolutely and almost instantaneously is new. A fresh powdered silicated carbon filter must be an excellent antidote in poisoning cases.—*The Sanitary Record*, July 8, 1876.

Utilization of Paris Sewage.—Since 1868, the Paris sewage has been employed to irrigate the large plain of Gennevilliers, which is inclosed by the windings of the Seine. This irrigation has converted the arid soil of this plain into a market garden of extraordinary fertility. No one disputes this, but it has been alleged that the sewage has acted injuriously upon the population of the district. An investigation, instituted by Dr. Bergeron, has proved the groundlessness of this statement, for with an increased population the longevity has also augmented, and the mortality declined. The water from the wells which has filtered through the soil is found quite void of organic matters.—*Med. Times and Gazette*, Oct. 28, 1876, from *Révue Méd.*, Oct. 9.

Smallpox.—London is threatened with an epidemic of this disease. The fatal cases of this disease, which were but 7 during the first quarter of this year, rose to 26 in the three months ending June, and further increased to 84 in the eleven weeks ending on the 16th of September.

During October the mortality of the disease diminished; the number of deaths during the week ending Oct. 28 was 15, as compared with 11, 16, and 22 in the three weeks immediately preceding. But in the week ending on the 4th of November the deaths mounted up to 21. The most unfavourable feature, says the *Lancet* (Nov. 11) of this week's return, is the wider distribution of the fatal cases. Further, on the 4th of November, the two Metropolitan Asylum District Smallpox Hospitals contained 231 inmates against 185 the preceding week. No less than 101 new cases were admitted during the week; the highest weekly number of admissions since the beginning of the present epidemic being 62.

University of Edinburgh.—Dr. Grainger Stewart has been elected Professor of Medicine to fill the vacancy caused by the death of Prof. Laycock.

School of Medicine of Paris.—It is stated (*L'Union Médicale*, Oct. 17th) that the city of Paris has commenced operations for the enlargement of this school. The size of the school will be tripled.

Canadian Medical Association.—This Society held its annual meeting at Toronto in August. The next meeting will be held in Montreal on the second Wednesday in September, under the presidency of Dr. Hingston of that city.

Obituary Record.—Died Sept. 21st, 1876, of phthisis pulmonalis, aged 64, Thomas Laycock, M.D., Professor of the Practice of Physic in the University of Edinburgh.

PROSPECTUS FOR 1877.

The continued favor bestowed on the "American Journal of the Medical Sciences" and its adjuncts enables the publisher to maintain for 1877 the very liberal terms offered during the past year, and encourages the Editors in the effort to render these periodicals, if possible, indispensable to every reading physician.

The "Monthly Abstract of Medical Science" will preserve the features which have already rendered it so popular, of presenting every month a carefully condensed and systematically classified view of the improvements and discoveries reported in the medical literature of both hemispheres. During the past year it has contained

36	Articles on Anatomy and Physiol.		109	Articles on Midwifery and Gynæcology.	
47	"	Mat. Med. and Therap.			
234	"	Medicine.	18	"	Med. Jurisp. and Toxicol.
169	"	Surgery.	8	"	Hygiene.

Or, in all, 616 articles in a single year, with an elaborate Index, forming an octavo volume of about 600 closely-printed pages.

The "American Journal of the Medical Sciences" has the promise for 1877 of its usual variety of important contributions from distinguished members of the profession in all parts of the country. Special attention will be bestowed, as heretofore, on its Bibliographical Department and its Quarterly Summaries to keep its subscribers informed as to all subjects of professional interest from every quarter.

In the "Medical News and Library" will be continued the translation, by Dr. Stimson, of Gosselin's "Clinical Lectures on Surgery," commenced in the number for July, 1876. New subscribers for 1877 can obtain the portion issued in 1876 on remittance of Fifty cents, if promptly made.

*** Cloth covers for binding the "Abstract" and the "Journal" will be forwarded free of postage, to advance-paying subscribers, on receipt of six cents in postage stamps for each cover. Of these there are two for the "Journal" and one for the "Abstract" in each year, and those for 1876 are now ready.

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VOL. XXXV. APRIL, 1877. No. 412.

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CLINICS.

CLINICAL LECTURES.

On Syphilitic Epilepsy. By M. CHARCOT, Professor of Pathology at the Faculty of Medicine, Paris, etc.

Partial or hemiplegic epilepsy is one of the most frequent affections attendant on cerebral syphilis. I have recently had an opportunity of treating several cases, and shall proceed to point out some special features connected with this form of the disease, and the rapid manner in which the bold administration of certain remedies will frequently triumph over it. The following case may serve as an introduction to my remarks:—

On the 13th December, 1874, I was called in consultation to visit a gentleman, æt. 42. For several months he had laboured under a serious cerebral affection, which confined him to his bedroom. The patient counted the date of attack from the month of July, 1874. One day, while sitting at his desk, and without any premonitory symptoms whatsoever, he was seized with violent convulsive movements in the right leg. They lasted for a very brief time; the limb then became rigid, was elevated for a moment, and the patient fell unconscious on the floor. The attack was not repeated, and the patient was able to resume his duties as a banker's clerk. In the month of September following, while getting off an omnibus, he had a second attack, precisely similar to

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the former one, but the effects were more lasting, slight weakness of the right side and considerable confusion of the intellectual faculties remaining. The third attack took place in November of the same year. On this occasion the prodromata were of longer duration, and the patient was enabled to observe that the convulsive movements, followed by rigidity, commenced in the leg, and very soon afterwards extended to the arm. He soon fell insensible to the ground, but a bystander observed that the head was drawn to the right side, that the face on the same side was spasmodically affected, and that the whole right side of the body became finally convulsed. This access was attended by stertorous breathing; some disturbance of articulation and a sense of numbness in the right cheek; the last two remained for a few days, and then subsided.

The history of the case pointed towards syphilis, but no actual syphilitic lesion was discoverable. On going back further, however, some light was obtained. When 30 years of age the man had contracted indurated chancre, followed by roseola and other constitutional symptoms. He underwent the usual treatment for several months, and seemed to have been radically cured, as no recurrence had taken place during a period of ten years. Towards the end of 1873 the general health gave way. The patient fell into a state of cachexia, attended by a peculiar kind of headache. The pain was at first confined to a very limited spot on the temple, above the right eyebrow. It often extended, by nocturnal exacerbations, to the head and occiput.

This peculiar form of headache is especially worthy of note, as it has frequently been noticed by writers on syphilitic epilepsy.

My opinion as to the nature of the case was soon formed, and I recommended what we call the mixed course, viz., mercury and iodide. It appeared, however, that the patient had been submitted to the same treatment for the last twelve months, without permanent benefit. I was not discouraged on learning this, but concluded that we must make a more vigorous attack by giving large doses of the remedy at short intervals. In two months great relief was obtained by mitigation of the leading symptoms, viz., headache, dyspepsia, and weakness of the limbs, while the epileptic attacks had ceased. The patient considered himself free from the disease. I saw him again at the end of 1876. Relapse had not taken place, and the patient, in outward appearance at least, seemed perfectly well.

Partial epilepsy, whether of syphilitic origin or not, generally commences by convulsive movements of the face or arms on one side of the body. An attack commencing in the lower extremity must, therefore, be regarded as exceptional. In some cases, moreover, the disease assumes the appearance of ordinary epilepsy, for the patient suddenly falls down in an unconscious state, followed by convulsions, which are more or less general in character. The imminence of the latter is constantly indicated by severe headache, confined to a limited spot on the side of the head. The pain quickly extends to the face and neck on the same side; but there are exceptions to this general rule, for in several cases I have observed that the premonitory headache occupied two points at the same time, one on the parietal, the other on the temporal region of the opposite side. In these cases the parietal pain was always seated on the side opposite to that of the convulsive movements. Another point to be noted is that the attacks very frequently set in towards evening. The manner of attack, and the succession of convulsive symptoms, are conformable to the rules established by Dr. Hughlings Jackson. That distinguished physician has observed that when the convulsive movements of partial epilepsy, commencing in the arm, tend to become more general, they attack the face before they extend to the leg. If the irregular movements have commenced in the face, the disease extends to the upper extremity first, and then to the legs. Lastly, if it be the lower extremity which is first attacked, the disorder of motor power is seen in the arm first, and then in the face. This constancy

in the order of succession is very remarkable, and appears to me calculated to throw light on various questions connected with physiology of disease.

Another point, illustrated by several of my cases, is this: The premonitory headache often occupies a circumscribed spot on one side of the head, while the convulsive movements appear on the other side of the body. This clinical fact is interesting, as it points to a relation between cause and effect; for we know that the cerebral surface which lies beneath the parietal bone, and especially the convolutions bounding the fissure of Rolando (the ascending parietal and frontal convolutions) constitute the motor zone which alone acts on the opposite side of the body, and when irritated produces a disturbance of motor power similar to that seen in partial epilepsy.

Circumscribed gummatous inflammation of the pia mater appears to be the pathological condition most frequently connected with partial syphilitic epilepsy. This has been pointed out by Todd, Echeverria, Lancereaux, and some other writers. It is, however, certain that several other forms of cerebral disease may be determined by this same gummatous meningitis. The variations, as we have good reason to believe, depend on the points of cerebral surface attacked. If we accept the theory founded on recent investigations, the gummatous patches in partial syphilitic epilepsy should be found on, or very near to, the ascending frontal or parietal convolutions. This has not yet been established by actual observation, but I feel confident that the proof is only delayed. So long as the disease has not become inveterate—so long, in a word, as there are intervals of freedom from attack, we are entitled to conclude that the cerebral substance had not been disorganized by the gummatous inflammation of the meninges. Upon this point and its clinical interpretation Dr. Hughlings Jackson has formed a very ingenious theory. To return, however, to therapeutical conclusions, I would insist on the necessity of having early recourse to energetic treatment in all cases of this kind, and not waiting until extension of the superficial lesions has involved the deeper layers of the cerebral substance, for then secondary descending alteration of nerve-tissue will ensue, and the probable consequence will be irremediable and permanent hemiplegia.—*Medical Examiner*, March 8, 1877.

—

Epilepsy and Epileptic Vertigo.—Prof. Bouchut recently gave a clinical lecture on two cases of epilepsy (*Gaz. des Hôp.*, January 23 and 25) at the Hôpital des Enfants Malades, of which the following is an abstract:—

Epilepsy in children is of very frequent occurrence, and differs greatly both in its etiology and prognosis from epilepsy in adults. It shows itself in two forms—epileptic vertigo (or *petit mal*), and epileptic convulsion (or *haut mal*). Of the 118 cases which Prof. Bouchut has met with, thirty-six were examples of epileptic vertigo, and eighty-two of epileptic convulsion. *Epileptic vertigo* presents itself under the most varied forms. Always of short duration, there is a fugitive loss of consciousness of a few seconds or a minute, during which the face preserves its colour, the eyes are fixed and turned upwards, and the head is immovable, being sometimes thrown backwards or turned to the right. The arms cease to act without becoming convulsed or rigid, and the lower limbs are immovable. If the child is sitting, he does not move beyond bending forwards or on one side, and then recovering the vertical position, like one asleep while sitting. If standing, he may bend and recover himself in the same way, or remain motionless. Sometimes speech is cut short by the crisis, and is resumed after the interruption. In rare cases there is emission of the feces or urine. These vertigos, rare at first, become more and more frequent, and are often unperceived by reason of their short duration or of their occurring at night. They may occur only every month, fortnight, every day, or very many times in a day, so that in one case 180 were counted in one day. These crises may last for several months in this form, infinitely varied, and then pass into the regular epileptic convulsion. In other cases they

cease spontaneously or yield to treatment.

Convulsive epilepsy is characterized by sudden and violent convulsive paroxysms, or may be preceded by premonitory symptoms known as the *aura*. Numerous well-marked instances of this aura arising at the extremities are on record, which also show the influence of its destruction on the cure of the epilepsy, and the possibility of arresting a paroxysm by a ligature or forcible compression applied in the track of the aura. When this premonitory symptom does not exist, the instantaneousness of the attack is characteristic. There may be pallor of the face with blanched lips, or this may be red or violaceous, with black lips and swollen neck. To the ophthalmoscope the fundus of the eye is pale in the one case, while in the other its veins are very red and very dilated. The convulsive paroxysm may only last for some minutes, or, subsiding for a moment, it may recommence and thus continue for one or several hours. When a calm has at last become established, the child falls into a more or less comatose sleep, which lasts from one to three hours, awakening with a sense of excessive fatigue. It is rare for these epileptic paroxysms to recur several times in a day, and they usually reappear at irregular epochs; and when they do exceptionally occur periodically, this is especially in girls arrived at the age of puberty and at the menstrual period.

The diagnosis of epileptic vertigo is easy, but the convulsive form may be often confounded with eclampsia, and in girls, with hystero-epilepsy. The mere accidents of the attack do not enable us to distinguish *eclampsia* from epilepsy, our diagnosis being derived from the accessory circumstances of the onset and the return of the convulsions. When the convulsion comes on suddenly and is followed by fever, it is eclampsia, and is the indication of a pneumonia, angina, eruptive fever, or other acute malady. When albuminuric œdema is present, it is also eclampsia, due rather to cerebral œdema than to uræmia. So also when the convulsion is the result of heat, the overcrowding of children, or indigestible aliments, it is due to eclampsia; as it is when it comes on without known cause, in a passing manner and without ulterior repetition. So similar are the intrinsic phenomena of the two diseases, that eclampsia might almost be termed a fugitive epilepsy. In distinguishing *hysteria* from epilepsy, the form of the convulsive accidents has to be taken more into account. Thus, when the loss of consciousness is not very complete, when there is some amount of recollection, and when the attack is announced by some intimate sensation other than aura, and is accompanied or followed by a sense of choking, and cries and laughter, with analgesia or cutaneous anæsthesia, it is hysteria; but when, as in some cases, there is absolute loss of consciousness, without tears or laughter, and profound sleep after the attack, it is hystero-epilepsy. This form is not very frequent in children, and affects chiefly girls after their twelfth year. One point is always a difficult one in the diagnosis of epilepsy —the decision as to whether the disease is essential (*i. e.*, caused by a temporary disturbance of the cerebro-spinal circulation), or whether it is symptomatic of an organic nervous lesion. This difficulty has, however, almost ceased to be one since Prof. Bouchut's researches in cerebroscopy, which are described at length in his recently published *Atlas d'Ophthalmoscopie Médicale et de Cérébroscopie.* If with the convulsions there is papillary œdema, with hyperæmia, neuro-retinitis, or tubercles of the choroid, the epilepsy is certainly dependent upon a cerebral or spinal selerosis, a partial encephalitis, or some deposit in the nervous substance. If there is no changed condition found in the fundus of the eye, we may believe (without, however, being quite certain) that the epilepsy will only prove temporary.

After a disquisition on the reflex and direct causes of epilepsy, for which we have not space, Prof. Bouchut passes to the prognosis, which he observes is very different in children and adults. Before the age of fifteen epilepsy is generally curable; and the aphorism of Hippocrates, that the epilepsy of childhood is cured after puberty, is entirely true. That it is

so probably arises from the fact that the majority of such epilepsies have their origin in the second dentition, when the teeth of a man are placed in the jaws of a child. After puberty they more easily assume their proper places, and the epilepsy ceases with the reflex action which produced it. Epilepsy from direct causes, as from sclerosis or other cerebral or spinal lesion, however, calls for a very different prognosis from those of reflex origin, for although they are sometimes ameliorated they are rarely cured.

In the treatment of epilepsy, wherever there is an aura we should endeavour to destroy it, as arrest of the attacks has been proved to follow the disappearance of this peripheral neuralgia. Thus, deep cauterization in neuralgia of a branch of the intercostal nerve cured the epilepsy in two cases. When the epilepsy is dependent on worms, appropriate vermifuges must be had recourse to; and the dyspepsia with which it is sometimes connected in children should be met by a vegetable and milk regimen, pepsin, small doses of bicarbonate of soda, the waters of Plombières, etc. In irregular second dentition, the removal of teeth which are too long in falling is often attended with advantage. Besides the rational treatment of causes, we may have recourse to antispasmodics which regulate the movements of the capillary circulation, such as belladonna, bromide of potassium, oxide of zinc, ether, chloroform, etc.; but of all these none possesses the same efficacy as the bromide. It may be given united with belladonna in the following formula, but it is upon the bromide that we should chiefly rely; Simple syrup 240, syrup of belladonna 60, and bromide of potassium 20 parts; of this doses of one gramme may be given two, three, four, and even to six times in the day, according to the case. The bromide does not in children produce the ill effects which it sometimes does in the adult, only accidents that have been observed, even in doses of six, eight, or ten grammes per diem, prolonged for some time, being stupor and hebetude, which disappear on diminishing the dose. If it be given in reflex epilepsy, in progressive doses of three or four grammes to children from five to nine years, and of from four to ten grammes to children of ten to fourteen, most of the cases will be cured. When the epilepsy arises from an organic cause, the most that can be done is to render the attacks less frequent. The application of cold externally by means of frequent douches is a useful auxiliary, tending by the cutaneous revulsion it induces to restore the equilibrium of the capillary circulation.—*Med. Times and Gaz.*, March 3, 1877.

HOSPITAL NOTES AND GLEANINGS.

Case of Intussusception successfully treated by Inflation.—On Dec. 14th, a male child, aged six months, was taken to the North Dispensary, Liverpool, and placed under the care of Mr. T. D. Ransford. Just before six o'clock on the previous evening the mother was dandling the child (which seemed at the time quite well and in good spirits, and had not presented any signs of diarrhœa or intestinal disturbance) on her knee. Quite suddenly the baby became pale and seemed in great pain, and broke out into a cold, clammy sweat. At half-past six it passed a blood-stained motion. All night the child was very restless, and got no sleep until 2 o'clock in the morning; it then slept one hour, and then passed blood again, while vomiting had been almost constant from the beginning.

When seen at the dispensary, the child seemed to suffer much from paroxysms of pain, during which he cried out and was very restless; the abdomen was flaccid and not painful on pressure, and an indistinct rounded mass was felt in the left hypochondriac region. He was taken to the Northern Hospital to be treated as an in-patient, but the mother would not consent. Here he was again examined, and as no other abdominal tumour could now be felt, and a rectal examination elicited very different opinions, the diagnosis of intussusception was considered doubtful. Nevertheless an injection of olive oil was tried: this was followed by no other effect than the passage of some clotted blood. The child was then sent home, where it was seen

shortly afterwards, and a drop and a quarter of tincture of opium given every six hours.

The child passed a tolerable night up to two o'clock, and passed no more blood; but next day the vomiting and pain continued unabated, and the obstruction seemed to be quite complete. Temperature in rectum 100.4°; pulse 136. At 3.30 P. M. the rectum was examined and found empty, but when the child strained something was felt to impinge upon the finger. The finger was stained with blood and mucus, but there was no trace of feces. Although the child had not vomited since the morning, vomiting occurred during the rectal examination. With the assistance of Dr. Cormac, inflation by bellows was practised for about twenty minutes, some air escaping per anum at each action of the bellows. The child passed about a tablespoonful of blood and mucus when the nozzle of the bellows was withdrawn.

Dec. 16.—The mother states that since the inflation the child has been easier, the vomiting has not returned and at five o'clock this morning he passed a liquid motion free from blood. Flatus has been passed in abundance, and he has had a good night. Child seems nearly free from pain. On digital examination, the rectum offered nothing abnormal, but was found full of feces, which passed in abundance on withdrawing the finger. Takes the breast well. Temperature in rectum 100.2°; pulse 128. For a day or two the opium was continued, with the object of keeping the bowels quiet and of relieving pain, for which hot fomentations were also applied. By the end of the second day everything was left off, and when the child was seen for the last time, on the 22d of December, the mother said he was well as ever, with the exception of being a little pale.

Remarks.—In this case the diagnosis of intussusception was doubted by some, because no abdominal tumour was felt; but West says "it happens in at least a large number of instances that the most careful examination fails to detect anything unnatural." It was also said that the absence of abdominal tenderness contraindicated intussusception; but Bristowe says there is "not necessarily any abdominal tenderness—indeed the patient often finds relief, as in colic, from pressure on the abdominal parietes." But the sudden attack in a previously healthy child seems diagnostic. Nothing else than intussuseeption could bring on total and sudden obstruction of the bowels, with early passage of blood and paroxysmal pain, in a baby six months old.

As to the treatment, every one will agree that an attempt to reduce the intussusception, either by inflation, or injection, or position, is to be made before other chances are taken into consideration; but, if these fail, is it justifiable to urge abdominal section? In this case the mother was told that if the bowel could not be got back, an operation might be necessary, but that it could not be said that the child was certain to die if it were not done; for although Hutchinson has stated that in cases of intussusception of the large intestine he had never seen a recovery take place, yet Bristowe states that "the results of the separation of the slough seem favourable in about half the total number of cases;" and as to the published statistics of the operation, they are very little to be trusted, for all the successful cases are certain to be published, while many of the unsuccessful cases are not. In a review of the subject, in the *Lancet*, some months since, eighteen cases are said to have been recorded, with eight recoveries. One thing seems certain, that unless an operation is done early in the acute cases, it is better to trust to cure by the bowel sloughing, for in one case of abdominal section which Mr. Ransford saw in a child, the intussuseeption could not be reduced, and the operation did no good. In the chronic cases death seems to take place from exhaustion, often before any inflammation or sloughing has taken place; and in this class no doubt abdominal section gives a very fair chance of recovery a long time after the symptoms have set in, as the cases of Messrs. Hutchinson, Marsh, and Howse prove.—*Lancet*, Feb. 24, 1877.

—

Chorea treated by Strychnia and Ether-Spray.—Dr. J. Magee Finny reported to

the Medical Society of the College of Physicians of Ireland (*British Med. Journal*, Jan. 6, 1877) four cases treated by these means. Case I. was one of severe chorea in a boy aged 13, without any history of rheumatism or of cardiac disease. The treatment by sulphate of strychnia, administered as recommended by Hammond (*Diseases of the Nervous System*, sixth edition, page 720), and by ether-spray along the back, was commenced a fortnight after the illness began. Immediate benefit was followed by recovery in fifteen days. The total duration of illness was, therefore, four weeks and one day. Case II. was one of severe primary bilateral chorea in a girl aged 11, without history of rheumatism or of cardiac disease. Improvement set in after four days' treatment; cure was complete in twenty-five days. The total duration of illness was six weeks and three days. Case III. was one of severe primary bilateral chorea in a boy aged 9; no rheumatism or cardiac complication. Improvement took place, but he left hospital before he was cured. Case IV. was one of chronic chorea, with relapses, in a young lady aged 15. The treatment led to considerable improvement in a week. The treatment of chorea ought to fulfil two indications: to shorten its duration, and to temper and moderate the more distressing symptoms; and, should it fulfil these, it deserves to be valued as useful. Reviewing the foregoing cases, the author would say of strychnia that, in the two cases in which its administration was fully and regularly carried out, it fulfilled the first indication by shortening the disease, and in those cases it rapidly alleviated the symptoms and quieted the movements. As far, therefore, as these cases go, strychnia proved to be well suited and the proper treatment. To come to any definite general conclusion on such a subject, without much and extended observation, would be in the highest degree reprehensible; but it is also the more the duty of each clinical observer to record the results of his experience.

Dr. MacSwiney referred to recent theories as to the pathology of chorea. Dr. Dickinson found in twenty-two fatal cases that there was universally present a dilated condition of the bloodvessels of the brain and spinal cord, and in many cases effusion of blood into the brain and spinal cord. The relationship between chorea and rheumatism was very remarkable. If the dilatation theory were correct, the efficacy of the cold of ether-spray and the peculiar therapeutic effect of strychnine could be understood. It had been recently stated that there were grounds for believing that hypermetropia occurred in all cases of chorea, and that the cure of the chorea could be effected by using glasses to correct the hypermetropia.

—

A Case of Lithotrity where Nitric Acid Injections were employed.—The solvent action of nitric acid upon the *débris* of a phosphatic calculus was well illustrated in the following case, which in many respects is similar to one recorded by the late Mr. Southam, of Manchester, and alluded to by Dr. W. Roberts in his Observations on the Solvent Treatment of Phosphatic Calculi. (*On Urinary and Renal Diseases*, second edition.)

William C., a police officer, aged 45, was admitted into the Liverpool Royal Infirmary, under my care, on March 9th, 1875. The patient had recently been under the observation of my friend Dr. J. S. Clarke, who, having diagnosed the existence of a stone in the bladder, advised his admission into the infirmary.

Upon examination, I found a single stone, rounded and having a diameter of two inches and a quarter. The urine was alkaline, and contained pus. Though the stone was large, I deemed the case not unfavourable for lithotrity. The patient required some preparatory treatment, and I was not able to commence lithotrity till April 5th. I repeated the crushings during April and May twelve times.

The patient never experienced any unfavourable symptom, and a very considerable quantity of broken-up stone was passed. As in Mr. Southam's case, to which I have alluded, it appeared to me that fresh phosphatic depositions were taking place almost as fast as the others were removed. I resolved, therefore, to use nitric acid injections.

On May 27th (two days after a crushing), I had the urine of twenty-four hours' collection. This was analyzed by Dr. J. Campbell Brown, who gave me the following report: The quantity of urine submitted to analysis was sixty ounces; this was found to contain 74.029 grains of phosphoric acid as alkaline earthy phosphates; 250.516 grains of phosphoric acid as alkaline phosphates; in all, 324.545 grains of phosphoric acid passed in twenty-four hours. On the termination of this twenty-four hours, I injected into the bladder half a pint of tepid water with two drachms of diluted nitric acid.

All the urine passed during the subsequent twenty-four hours was kept and analyzed by Dr. Brown, with the following result: The quantity of urine submitted to analysis was seventy-eight ounces; this was found to contain 96.237 grains of phosphoric acid as alkaline earthy phosphates; 461.94 grains of phosphoric acid as alkaline phosphates; total, 558.177 grains of phosphoric acid passed in twenty-four hours.

Thus it appears that not only was a larger quantity of phosphate of lime and magnesia dissolved in the urine after treatment with nitric acid, but there was a still greater increase in the quantity of phosphoric acid passed in the form of alkaline phosphates. It is to be noticed that the quantity of urine on the day after treatment was greater than on the day before; and that, if, instead of estimating the total phosphates, we estimate the percentage of phosphates in the urine, we find that the percentage of alkaline earthy phosphates was very nearly the same after as before treatment, namely, increased from 0.272 to 0.282, and that the percentage of alkaline phosphates was increased from 0.95 to 1.35. But the absolute increase of phosphates is much more marked.

On nine subsequent occasions the lithotrite was employed, and, on every second or third day afterwards, the bladder was injected as before with nitric acid in tepid water. Further observations, though made in a rougher manner, showed the increase of the alkaline phosphates after each injection; it was also noticed that the fragments passed were much more finely triturated than previously.

Under this treatment the patient made a good recovery, and left the infirmary quite well on June 21st. The total quantity of broken-up stone collected weighed four drachms. The use of the acid appeared to me at once to stop any further deposition of phosphates, and to facilitate the removal of the pieces as they were broken up by the lithotrite.

Dr. Roberts concluded his observations on Mr. Southam's case with the remark (*op. cit.*, p. 313): "This method is evidently capable of wider application than is now made of it by surgeons."—*British Med. Journal*, Jan. 6, 1877.

MEDICAL NEWS.

DOMESTIC INTELLIGENCE.

Lister's Antiseptic Method.—Dr. J. S. Billings, of the U. S. Army, in a lecture (*Med. Record*, March 3, 1877) delivered in Baltimore shortly after his return from Europe, spoke of the antiseptic method as follows:—

"I was acquainted with Mr. Lister's teachings before visiting Europe, and assented to them in a theoretical sort of way; but at the same time I looked upon the antiseptic method as being the latest fashion, and therefore probably overpraised. But after learning the result of its employment in the hospitals at Bonn, Leipzig, Berlin, and in certain wards in London, and especially after an examination of Mr. Lister's wards in the Royal Infirmary at Edinburgh, and seeing the cases dressed in all stages after operations—operations such as opening the knee-joint, or upon abscesses of spinal origin—I came to the conclusion that this method is the most important contribution to our resources in surgery which has been made since the discovery of anæsthesia. Not that the details of the method are perfected, for probably much may yet be done to simplify it, and we may perhaps discover a better material for the purpose than carbolic acid; but we now may be said to know positively, instead of merely conjecturing, that the process of putrefaction is due to minute

still walks with pain and with the help of a cane. Every movement, every touch, awakens suffering, and yet there has been no abscess, and syphilis cannot be for a moment supposed.

What other name than that of *osteitis of neuralgic form* for the first period of the disease, and osteo-neuralgia for the later period, in which it is difficult to believe in the persistence of an inflammatory process in the absence of suppuration and fresh swelling; what other name, I ask, can we find to indicate these unusual painful forms?

V. *Fracture consolidated since six months ago; persistence of painful arthritis.*—This patient is a woman, 58 years old, whom I treated for simple fracture of both bones of the right leg, in the lower third, six months ago. Consolidation was neither very painful nor slow. At the end of two months and a half, the patient left the hospital, unable to walk without crutches, and evidently suffering in the tibio-tarsal articulation. I then expressed the fear that the arthritis would last for a long time, that perhaps it would never disappear, for the age of the patient and the rheumatic pains which she had often felt, made me think her arthritis might take on the chronic and incurable form of the dry arthritis of old people. To-day, six months after the accident, the lower part of the tibia and the internal malleolus are hypertrophied, there is also a notable swelling of the ankle; the spontaneous movements of the articulation are very limited; communicated movements also are limited, cause pain, and are accompanied by some crackling. There is then, here, a persistent arthritis which seems to me to belong to the category of dry arthritis. The patient will be kept quiet, with soothing frictions and poultices for two or three weeks. I shall also give her some douches and sulphur baths. We shall thus obtain an amelioration; but I do not dare to hope for an entire cure, which, however, I should consider possible if the patient were younger. I fear that this woman is condemned to walk always with crutches, and very slowly, and that admission to La Salpêtrière[1] is the only useful thing we can offer her.

VI. *Fracture of the leg cured with rotation outwards of the upper fragment (consecutive displacement).*—I have again called your attention to a patient whom I treated here for a V fracture of the left leg, a simple fracture, but one which I could not reduce completely, as indeed happens quite often in V fractures. I placed the leg in a wire trough, and established compression all along the upper fragment, except at its point, where an eschar might have been produced. This patient, who is only forty years old, still suffers in walking, and as there is a notable swelling of the ankle, I consider him still affected with the remains of arthritis "by proximity," which we see after fractures, and especially after those which have a fissure extending to the articulation, as often happens in the V fracture. I have admitted him to let him rest for a few days, and to show you a deformity left by the fracture, deformity which I have seen several times, but which is not very frequent. When the patient is lying down and is asked to place his feet side by side, he does it easily, but by turning his thigh and

[1] An Asylum for Incurable and Indigent Old Women.

knee outwards. If asked to place his knees in the same position, we see the foot and lower part of the leg turn inwards, that is to say, consolidation has taken place in this patient, not only with the slight projection of the upper fragment which you see, but with a rotary displacement, the upper fragment having turned about its axis from within outwards, and the lower one, with the foot, from without inwards.

This is a deformity, but it causes no trouble in walking. As soon as he gets rid of his arthritis he will walk, but with his foot turned inwards; and after all, when dressed, the deformity will not amount to much.

It was more than ten years ago that I first noticed this variety of deformity, which, so far as I know, has not been pointed out by our authors, and since then I have seen it five or six times.

I should like to be able to tell you what causes it, how it happens, and how it can be prevented, but I don't know much about it.

The rotary displacement does not exist at the beginning, or if it does exist, it is so easily corrected that we do not pay much attention to it. It appears especially in fractures with transverse displacement of the upper fragment difficult to reduce and to keep reduced. Thus far, I have seen it only in V fractures. It appears from the eighteenth to the twenty-fifth day, after the patients have been long under treatment, and all has been done that should have been done, and care has been taken to place the inner border of the foot and of the patella in the relations which I have indicated. If the surgeon continues, while watching the patient, to occupy himself only with the position of the foot, all seems to be going on well, but if, at the period of which I speak, he compares the position of the foot with that of the patella, he sees that the latter is turned outward. He then removes the apparatus to make sure of the fact, and finds that, the foot being kept in place, it is the upper fragment, and the femur with it, which have turned outwards. It takes place little by little, without pain; the patient does not notice it, and when the surgeon discovers it the effect is irremediable; for it is useless for you to try to correct this consecutive displacement.

For me, at least, whatever plan I have tried has failed; and it is easy to understand. The consolidation is already too far advanced to permit the deformity to be corrected. We might make the callus yield by violent manœuvres, but we might also fail, and even if we did succeed, the consecutive displacement might be reproduced during the new consolidation. Perhaps also the exaggerated osteitis thus produced might cause dangerous suppuration. I have, therefore, considered it prudent to confine myself to moderate attempts at reduction, and they have not succeeded.

From the notions which I have given you, you should draw this conclusion, that, notwithstanding all possible attention, deformities, which could not be prevented, are possible after fracture of the leg, and instead of attributing them to the carelessness of the surgeon, as non-professional people are so prompt to do, we must consider them due to peculiar and inevitable conditions which our authors have not

made sufficiently prominent. I shall add this other conclusion, that we cannot, in these cases of difficult fractures, give too much care and watchfulness during the first two or three weeks to the situation of the foot, with reference to that of the patella and knee. Perhaps, if you recognized this rotation from the beginning, you might remedy it, at least in part, and be more fortunate than I have been, for thus far I have only discovered it when it was too late to correct it.

LECTURE XVII.

FRACTURES OF THE LEG.

I. Fracture of the left leg more than a month old—Obliteration of the veins. II. Consolidation retarded. III. Pseudarthrosis with angular displacement; suture of the tibia; purulent infection.

GENTLEMEN: I. I called your attention during the visit to the patient, in No. 39, who has been treated for more than a month now in the wire trough for a fracture of the right leg. I could not apply an immovable apparatus on account of the numerous phlyctenæ and two small superficial eschars, the dressing of which required the leg to be left uncovered. The patient has had considerable œdematous swelling of the leg and foot for several days. This swelling, which occurred without pain, is not very rare in the course of fractures of the leg. You will find it rather upon adults and old men than in young people. What does it mean, and what will it become? It means that the venous circulation is obstructed in consequence of the coagulation of the blood. I do not think there is thrombosis of the femoral vein, for I did not feel a hard cord along its course, and pressure upon it did not cause the pain which is rarely absent in such a case. It is rather a thrombosis of the anterior and posterior tibial veins. We do not here find the pains which spontaneous phlebitis, with coagulation, often causes; but this pain is generally absent when only veins of the second order are involved. We cannot feel the hard cord because the veins are too deeply placed to be reached by our fingers, and the existing œdema increases the difficulty. I cannot, therefore, prove the existence of the thrombosis by physical signs; but I admit it because I know it has sometimes been demonstrated in autopsies after fracture, and also because I cannot otherwise explain the œdema. Notice that this is not an inflammatory swelling of the first period, for the tumefaction did not appear until towards the 27th day, long after the inflammatory phenomena had disappeared. On the other hand, we cannot attribute it to a disease of the liver, nor of the heart, nor to albuminuria, for the other foot is not œdematous, and the patient presents no symptoms of these different

diseases. This little complication is instructive from two points of view; first, because the thrombosis will undoubtedly last a long time, several months; the œdema will increase when the patient begins to walk, and this swelling will join the other causes, with which you are acquainted; rigidity of the articulations and tendons, weakness of the muscles, to oppose the re-establishment of the functions; second, because it explains the possibility of the fatal emboli, of which Professor Velpeau[1] and M. Azam, of Bordeaux,[2] have published cases. We ourselves had here, two months ago, a woman who, on the 27th day of her treatment for a fracture of the leg, was suddenly taken with oppression, precordial pain, and lipothymia, which we attributed to a pulmonary embolus too small to cause death, but which, if it had been a little larger, would have completely obstructed the pulmonary artery and killed the patient promptly.

I wish I could point out, as a complement of these facts, a way to prevent the detachment and passage toward the heart and pulmonary artery of clots which I suppose to exist in the tibial veins inflamed by their proximity to the osteitis of the callus. But I am not acquainted with any prophylactic measures against embolus. That is one of those unfortunate complications which the practitioner should know of, but which, in the present state of our science, he can neither prevent nor cure when it appears.

II. *Delay of the consolidation.*—Since I am speaking of the consecutive and tardy phenomena, I want to call your attention to two patients with broken legs, the consolidation of which is delayed.

One of them, No. 5, Ward St. Vierge, is a young man 23 years old, who was admitted with a compound fracture. Thanks to the occlusion which we made with collodion, there was no suppuration, and then I hoped everything would pass as in a simple fracture; the limb was placed in a trough; the patient suffered no pain, but, when at the end of forty-five days I removed the apparatus, I still found very marked mobility; the 20th January, two months after the accident, as the mobility persisted, I applied the immovable apparatus which is still upon the fractured limb.

The other is a woman in No. 17, Ward Sainte Catherine; her fracture is more recent than the preceding one, dating from only forty-five days ago; however, the mobility and the pains which, from the beginning, have been greater than usual, still persist and compel us to use restraining apparatus.

Here are two examples of consolidation that has made but little progress; but notice, gentlemen, that I do not say non-consolidation, pseudarthrosis. For we must not confound a delay with a non-existence of consolidation, and, like Norris, perform operations in cases which would doubtless have been caused by immobility. As for myself, I claim that at least a year must elapse before the word pseudarthrosis is to be pronounced in a fracture of the leg. But to what can we attribute the delay in our patients? I admit that I

[1] Velpeau, Comptes Rendus de l'Académie des Sciences, 14 April, 1862.
[2] Azam, Bull. de la Société de Chirurgie, 7 June, 1864.

find no cause. Syphilis, scurvy, pregnancy, nursing, have been invoked to explain pseudarthrosis; I cannot discover here the existence of any of these general causes; and if it is possible for syphilis to delay consolidation, our patients have not had it. If we examine the local causes we find, as a possible explanation of the delay, defective fixation of the fragments; but here immobility has been too well maintained for us to admit this cause. Finally it might be permitted to believe that there is, between the fragments, a piece of tendon, muscle, or aponeurosis, or a splinter which, by its interposition, prevents the callus from forming, but that is a thing which we cannot recognize, and which, indeed, we could not remedy.

We shall continue then to keep our patients' limbs completely immovable, and we shall give phosphate of lime internally, to hasten the formation of a long callus.

III. *Ancient non-consolidated fracture, or pseudarthrosis, with angular deformity of the leg; suture of the bones; purulent infection; death.*— Gentlemen, pseudarthroses due to non-consolidation of fractures of the leg are exceedingly rare. You sometimes hear me speak of delays, but you have never seen any of our patients remain without consolidation. During more than twenty years that I have practised in the hospitals of Paris, I have not seen a single one of the fractures of the leg which I have had to treat, remain in the condition of pseudarthrosis. I am surprised then to find in Malgaigne's work the statistics of an American surgeon, Norris, in which are found—

30 pseudarthroses of the humerus,
18 " of the femur,
14 " of the leg and tibia alone.

I wish to put you on your guard against the interpretation which has been given to certain observations in this table, and against the abuse which has been made of operations designed to cure pseudarthrosis.

The error is due to two causes: first, because, at a certain time, at the beginning of this century, when the operations of seton and resection had been proposed, some surgeons in America confounded delay in consolidation with non-consolidation, and considered fractures which still gave mobility during the second or third month, as having passed to the condition of pseudarthrosis. Now we know to day that those fractures end by consolidating after four, five, or six months of treatment. The second cause is that they did not distinguish, among the pseudarthroses, those which they observed, or thought they observed, in patients who had been regularly treated, and those presented by patients who had remained without treatment, and whose limbs had never been set. Now you may be sure, gentlemen, that pseudarthroses, not only in the leg, but also in the humerus and femur, are exceedingly rare in patients who have been properly and perseveringly treated. If we remove from Norris's statistics the patients in whom they despaired of consolidation too soon, there would remain only those whose injury had not been treated at all. Now, those are extremely rare, for generally, fractures of the leg are so painful, that

the patients have to keep quiet, and so easily recognized that the diagnosis must be made, and lead to treatment by immobility.

You may, however, meet with patients who suffer little, and in whom the diagnosis is rendered difficult by certain anatomo-pathological conditions.

I once treated a child, six years old, who had had a fall three weeks before I was called to see him. At Geneva, where the little patient then was, the surgeon who was consulted had not detected the fracture, and had allowed the child to walk, which he did with a little difficulty at first, but afterwards quite easily. He was brought to Paris, where one day he made a misstep, and felt a new pain in his leg (it was the right one). I found, near its middle, a slight swelling, which I was told had existed since the first fall; also pain on pressure at this point, where there was, however, no ecchymosis; and, finally, after several unsuccessful attempts, I felt very distinctly a mobility and a crepitation which left me no doubt as to the existence of a fracture of the tibia, and probably of the tibia alone. I did not doubt that this fracture had existed since the first fall, and had been consolidated not at all, or so incompletely that the new accident had caused the imperfect callus to yield.

Several conditions in children and young people may render diagnosis difficult, not only of a fracture of the tibia, but also of a simultaneous fracture of the tibia and fibula. The first is the preservation, at the place of fracture, of the periosteum, which acts as a means of union. The second is the toothed disposition, with reciprocal interlocking of all the points, and little excavations which correspond to them upon the other fragment. These two conditions, which, moreover, may very easily exist together, not only oppose displacement, but may prevent detection of mobility and crepitation.

In a young man whom I treated in 1865, at La Pitié, and over whose right leg the wheel of an empty cab had passed, I was unable at first to recognize a fracture, and after several examinations, I made the diagnosis, *contusion of the leg*. The patient kept the bed because he suffered while standing, but he moved as much as he liked in it. It was only on the eighteenth day that, a small abnormal prominence appearing, I was led to examine it again, and I then felt a fine crepitation and a mobility, indicating a fracture of the tibia which I had mistaken at first for the reasons I have given. Suppose that in my little patient and in this latter, at La Pitié, new examinations had not been made, and they had continued to walk. Undoubtedly, consolidation would have been possible, but it might also have failed and a pseudarthrosis been established.

This is what probably took place in the young man, 19 years old, who was admitted into Ward St. Louis, No. 50, the 27th November, 1866. He told us that in December, 1864 (he was then 17 years old), one of his comrades had given him a violent blow with a stick upon the lower part of his left leg. He suffered, but did not fall; was not obliged to keep his bed, and continued to walk, though limping, without consulting anybody. He only knows that a small lump appeared at the place where he had been struck. A month after this

accident he fell while trying to jump over a ditch. The same leg gave him a great deal of pain; he was carried home, where he kept the bed for several days, and then resumed his work in a factory. But he could no longer endure the fatigue; his leg caused him pain after a few hours of walking.

A little later he fell again, and was admitted to the Hôtel-Dieu, where he remained ten days without anyone speaking to him of fracture. After that he walked with more and more difficulty without being able to bear his foot upon the ground; then he saw that his foot turned outwards, and that his leg bent, forming an anterior and internal angle. This bad conformation was increased by the manipulations of a bone-setter.

To-day we are struck with the deformity of this limb. The foot and the lower part of the leg are turned outwards, and the leg presents, at its anterior and inner portion, an angle, the opening of which is directed outwards. Grasping the leg above and below this angle, we feel a mobility from before backwards and transversely which is not very marked, but which does not allow us to doubt the existence of an imperfectly consolidated fracture, of a pseudarthrosis with incomplete vicious callus. For the last six months the patient has been able to walk only by the help of a wooden leg, upon which he rests his knee. He declares that he will not remain in this state, and that at any price he wishes his leg to be straightened and solidified; he has repeated this declaration so often during the week he has been here, that I have determined to make an oblique resection followed by suture of the two bones.

Fig. 11.

Angular pseudarthrosis of the left leg.

The operation was performed in the following way: An incision about three inches long, and parallel to the axis of the limb, was made along its anterior portion, and crossed by another about two inches long. The four flaps made by these incisions were dissected backwards, and the angle formed by the two fragments of the tibia exposed. I then divided the intermediate fibrous tissue which united the fragments, and, exposing the lower one, I made, with a small saw, an oblique section downwards and inwards on the inner and posterior faces of this fragment. I then made the upper fragment project, and made, on its outer face and anterior border, a similarly oblique section downwards and inwards, so that, the two sawn surfaces facing one another, I could bring them exactly together. I then replaced

the limb in its proper position, and with much difficulty perforated the fragments with a drill, and then passed a double silver wire through the holes, with which I fastened the bones together. The limb was then placed in a wire trough with cotton and oiled silk, and the wound, which was not united, was covered with a simple cerat dressing.

In short, the operation which you saw me perform was a mixture of resection and suture. Resection, without suture, was made in 1760, by White, and afterwards by a certain number of English and American surgeons. Then resection, followed by suture, was made in 1825, by Kearney Rodgers, an American surgeon, and by Flaubert, of Rouen, whose two cases were reported by Dr. Laloy.[1] It is true, that in all these cases the pseudarthrosis was of the humerus, and in all, except Flaubert's second, the section was perpendicular to the long axis of the bone. My operation was peculiar in this, that it was performed for a pseudarthrosis of the tibia, and that, conformably to the precept given by Flaubert after his second case, which was, if I am not mistaken, a case of vicious callus, and not of pseudarthrosis, I made oblique sections in the two fragments in opposite directions, and united them with a suture.

My patient, unfortunately, was attacked with purulent infection ten days after the operation, and died the 27th December. I show you here his lungs and spleen, in which you see numerous metastatic abscesses. There was also a sero-purulent effusion in the two pleural cavities, suppurative arthritis of the knee above the fracture, and an abundant suppuration between the fragments, which, though still held in contact by the suture, are not united by the beginning of a callus.

LECTURE XVIII.

FRACTURES OF THE PATELLA.

Non-consolidated fracture of the left patella, dating from 18 years before; separation of two and a half inches—Study of the movements and functions of the limb.

GENTLEMEN: I stopped for a long time this morning at No. 25, Ward Sainte Vierge, to study and to show you the results of an old fracture of the patella, the fragments of which are widely separated from one another, and do not seem to be united by an intermediate fibrous substance.

The man, who is 50 years old, tells us that 18 years ago (in 1850) he was brought to the same ward for a fracture of the left patella.

Velpeau applied an immovable bandage, with which the patient

[1] Laloy, Thèses de Paris, 1839.

was allowed, he says, to walk after the tenth day. He assures us that the apparatus remained in place for four months, and that when it was removed the distance between the fragments was considerable. They then applied another apparatus which he cannot very well describe, but which seems to have consisted of two vertical straps fastened, one about the thigh, the other about the leg, with a circular bandage, and tied together over the patella; they were intended to keep the fragments near one another. This apparatus was removed every five or six days for about two months, and then, that is, six months after the accident, the patient left the hospital, walking with crutches, and with a considerable separation of the fragments.

He spent six months in the country, during which his walking improved so much that when he returned to Paris he could walk easily and without a cane, take long walks without being fatigued, and did not hesitate to resume his former occupation of bar-tender.

He comes to us to-day for a small contused wound of the right leg, and would not have spoken of his former fracture, of which he no longer thinks, if we had not noticed it ourselves.

You noticed a notable deformity of the left knee. Two small bony prominences appear over it, separated by a long depression. We can feel that these two prominences are nothing else than the fragments of an old transverse fracture of the left patella, and by pressing back the skin over the intermediate depression we can feel the condyles of the femur. When the limb is extended, the separation is two and a half inches; when bent, it is five inches. When the leg is bent, we can see the outlines of the condyles of the femur under the skin between the fragments.

The patient complains of no pain, and has never had any inflammation. There is the usual amount of flexion and extension, and no abnormal lateral mobility.

We studied the movements, and found that the patient made all of them easily except those which require the almost exclusive intervention of the quadriceps femoris. For example, while he was lying down, I asked him to flex and extend the knee; he did it quite easily, but I showed you that the extension might be explained by the relaxation of the flexors, and the pressure of the heel upon the bed. To see if he used the quadriceps normally, I asked him to raise the heel from the bed without previously bending the knee. He was not able to do it. I then told him to bend the knee and then raise his foot from the bed and carry it into the air. He could not do that either. It is true, that all the muscles of the thigh, and especially the quadriceps, are less voluminous than those of the opposite side, as is the case, I have often told you, with almost all muscles after fractures. But although diminished, these muscles are not paralyzed. You saw that they hardened during the attempts he made to do what we asked of him, and that even the lower fragment was drawn up a little. If the movement of elevation of the foot, in the production of which the psoas and iliacus aid a little, but for which the action of the quadriceps is absolutely necessary, cannot be executed, it is because this

action is not sufficiently transmitted to the tibia through the ligamentum patellæ.

I then made the patient rise and walk before us. He did it without the slightest hesitation or limping.

While he was standing with his feet together, I asked him to move the left one forwards; he did it, but by flexing the knee. I asked him several times to bring the foot forward without thus bending the knee, but he was unable to do so. Why? Because as soon as the foot is detached by the action of the psoas, iliacus, and adductors, the knee is held too feebly, and the foot falls either by its own weight or by the action of the flexors which are not counterbalanced. In fact, it is the quadriceps alone which can keep the knee extended whilst the foot is carried forward.

Although the physiological analysis of the functions of the limb shows us the loss, or at least a great diminution of the contractions of an important muscle, it is nevertheless true that the patient makes up for this loss by means of the psoas and adductors, and has no great difficulty in walking. He mounts staircases quite easily, descends them with a little more hesitation, placing both feet upon each step; can easily walk five miles without a cane, and continues uninterruptedly his fatiguing occupation.

The anatomical deformities, or, if you prefer, the morphological vices of a fracture of the patella with separation, are here carried to their greatest degree. I should tell you that you will find similar ones in many patients, but to a much less degree.

We often see a smaller separation, of not more than an inch, for example, cause at first functional troubles as great as those of our patient, and then gradually the patient becomes able to use his leg almost as well as the other. He feels his infirmity only when descending a staircase, and the surgeon detects the lesion only by telling the patient to raise his heel from the bed or to move his foot forward without bending the knee. These two equally difficult movements indicate an old fracture of the patella. That is the ordinary result. Do not forget it, whether the separation is greater or less, the limb is neither more nor less weak; it remains weakened, that is incontestable, but the patients, except, perhaps, those who have to do heavy work, do not perceive it, or habit has taught them to counterbalance the defect of contraction so well, that they pay no more attention to it.

Bear in mind, however, that this proposition, relative to the mode of cure of transverse fractures of the patella, is not absolute, and does not apply to all cases.

I establish, like our classic authors, a distinction between fractures without separation, or a separation of a few lines only, in which part of the surrounding fibrous tissue remains intact, and fractures with separation of half an inch or more, in which the fibrous tissue is completely torn across.

In the first case the fracture heals without separation, and with a bony callus, and the functions of the quadriceps are entirely re-established.

It is in the second case only that persistence of the separation is the rule, that its increase during the first weeks is not very rare, and that the cure is not by a bony callus. A cellular or cellulo-fibrous substance is formed between the fragments, and if it is dense it allows partial transmission of the effects of the contraction of the quadriceps to the ligamentum patellæ; but if it is not dense, and it almost never is, it does not permit this transmission.

Such is the rule; but I add at once that exceptions are possible, and that you may be fortunate enough to obtain, by a well-directed treatment, or by the existence of favourable organic conditions in your patient, the exception which we always seek, that is, the cure of a transverse fracture with separation either by a bony callus, or by a fibrous one strong enough to permit perfect extension of the limb.

Now two questions naturally arise here. Why these results? Why do our methods of treatment succeed only exceptionally in getting better ones?

1st. Why do we have recovery with separation and a too soft fibrous callus, or none at all? On account of local and general causes.

The predominant local cause in the case of an unopposed or unsuccessfully opposed separation, is the communication of the fractured surfaces with the articulation, and with an articulation which, participating in the consecutive phlegmasia, fills up with blood and synovia, and remains full of liquid for several weeks. The materials which would serve for the formation of a callus fall into this liquid and are lost in it. This explanation was first given long ago; you will find it in all your books, and it is always true.

A second local cause is the absence, before and behind the fracture, of tissues which might help to form the callus. For I have supposed that the fibrous tissue, which performs the part of periosteum and establishes the continuity between the end of the triceps and the beginning of the ligamentum patellæ, is broken. What remains in front of the patella? Connective tissue and the synovial bursa; but these tissues, not having been torn, do not undergo the consecutive inflammation which would enable them to exude the materials of the callus, or if by chance they furnish some, they fall into the articulation, and are not kept between or about the fragments. This absence of torn tissues, in front of and about the fracture, serves for an answer to the objections of those who say you attribute the difficulty of consolidation to the effusion of the reparatory liquids into the synovial cavity; how then does it happen that the vertical and transverse fractures without separation, or with very moderate separation, recover with a bony callus? The answer is very simple; it is that there remains about the fragments in the last two cases a fibrous portion which keeps them together, which has been sufficiently torn to furnish reparatory materials, and which serves as support and gangue to the callus, which having begun in it extends gradually between the fragments. Furthermore, when the latter remain almost in contact, we may suppose that the reparatory glutinous substance of the first days

is retained upon their surfaces in sufficient quantity to furnish useful materials to the callus.

The general causes are inherent to the constitution. Remember, gentlemen, that this is a contest between two opposing forces; a tendency to repair, which exists for this bone as for all the others, and an effort constantly exerted by the tonicity of the quadriceps to keep up, and even augment the peculiar displacement which exists in this variety of fracture, displacement by separation through muscular action. Now, by increasing the separation, the quadriceps elongates the reparatory substance, disarranges it, and opposes its calcareous transformation.

Consequently, in fractures with considerable separation, you can have a bony or a very solid fibrous callus only if the surfaces of the fragments furnish materials capable of being rapidly transformed into solid substance, and if the muscles will remain inactive for a sufficient length of time during the treatment which you have instituted. We occasionally meet with patients in whom the reparatory tendency is sufficiently strong to furnish a solid intermediate substance during the time that we are acting upon the fracture. But we find more in whom the intermediate substance has not been able in this time to get the necessary solidity.

2d. Why do not our means of treatment always succeed in preventing this imperfect consolidation? You know why, if you have well understood the preceding details. We do not succeed for three reasons.

The first is that we find it difficult to bring the broken surfaces together, and to successfully oppose the action of the quadriceps. We sometimes succeed in bringing them into contact with the aid of certain apparatuses of which I shall speak. But this contact does not last very long. The quadriceps ends by slightly overcoming our opposition. If by chance it does not reproduce the entire separation, it reproduces it partially; or the fragments remain together in front, but separated behind. The second cause is that, in spite of the retention, the patient instinctively flexes the knee a little on account of the pain, and thus reproduces some of the separation. The third reason is that the contention is so exact that the patient suffers and loosens the apparatus, thus allowing the separation to again take place.

All three causes, or only two of them, often act at the same time, and in any case the same effect is produced, effusion into the articulation and immersion of the reparatory materials in the liquid which it already contains.

But that is not all; suppose that the mechanical problem has been solved, and that the fragments have been kept in place by the apparatus which you have chosen. If the consolidation is not complete when you remove this apparatus, from the 60th to the 80th day, for example, the quadriceps will recommence its unfavourable action. Its tonicity separates the fragments again, the intermediate substance yields, lengthens, and if the patient moves a little (and how are we to prevent him from moving after so long a time?), consolidation is

arrested, and you have a separation with a soft intermediate substance, which amounts to about the same as if you had no intermediate substance. It is only in young and healthy patients that, during the eight or ten weeks of the application of the apparatus, the exudation has the time to organize into a strong fibrous or fibro-calcareous tissue so solid that the quadriceps can no longer act successfully against it and reproduce or increase the separation.

LECTURE XIX.

FRACTURES OF THE PATELLA.—Continued.

I. Recent fracture of the patella with a separation of nearly three-quarters of an inch—Difficulty of the cure—Indications to be met—Different treatments by two kinds of apparatus; some closed, others open—Preference given to rubber rings. II. Sprain of the callus, and apparent relapse a year after a fracture of the patella.

Gentlemen: I. A man, 35 years old, a carpenter, whom we saw this morning during the visit (Ward Sainte Vierge, 28), caught his foot yesterday morning in his workshop among some pieces of wood which were lying on the floor. He fell forward, made a violent effort to save himself, and then fell backwards, feeling a painful sensation in his left knee. He was lifted up, and tried to walk, but could only take a few steps backwards, dragging his leg and leaning upon a comrade. He was at once brought to the hospital, and this is what we find:—

As physical signs:

1st. A notable swelling of the knee with a fluctuation that leaves no doubt of the existence of an effusion.

2d. A transverse depression in which the finger can easily lie, indicating a separation of nearly three-quarters of an inch, and increasing when the knee is bent.

3d. Above and below this depression a bony fragment, each of which can be easily moved sideways, and is evidently formed by one of the halves into which the patella has been divided.

As functional signs:

1st. Moderate pain when the patient does not move.

2d. Ability to flex the leg upon the thigh.

3d. Inability to then extend it without using his hands or pressing his heel forcibly upon the bed and making it slide downwards.

4th. Utter impossibility of detaching the heel from the bed, and notable increase of the pain in the knee when he makes the attempt.

By these signs you all recognize a transverse fracture of the patella

with a separation which indicates the complete rupture of the fibrous tissue in front of it.

This fracture has been produced by muscular action, for the patient fell, not forwards, but upon his back. I ask myself if these indirect fractures, by muscular action, should not be explained by a premature rarefaction and fragility of the cancellous tissue of the patella? However that may be, the lesion is not complicated by a sprain with lateral mobility, such as I have twice met with in fracture of the patella; but it is accompanied by an effusion into the articulation which, considering the rapidity of its production, must be principally formed of the blood furnished by the patella and the lateral fibrous tissues which were torn at the same time to a certain extent. But such an effusion does not take place after a traumatic lesion of the knee without causing the synovial membrane to inflame and promptly secrete an excess of synovia which increases the quantity of the effusion. There is then, together with the fracture, a beginning of the traumatic arthritis which is inevitable under such circumstances.

What is the prognosis and what will be the consequences of this fracture?

The prognosis is not serious, in this way, that life is not at all endangered, and in all probability the patient will recover the use of the limb to such an extent that he will be able to stand up, walk, and gain a living by the trade which he has heretofore exercised.

But the prognosis is bad in this respect, that the injury will compel the man to remain in bed for about two months, then to walk with crutches for one or two more, and finally to walk slowly with a cane for at least as much more. It is impossible to fix exactly the number of days, but it will be very long.

You will hear of patients who, after fracture of the patella, have remained only four or five weeks in bed, and have been able to walk without a cane at the end of two months. But those were patients who had fracture without rupture of the anterior fibrous tissue and without separation. In naming the approximative limits of the duration, I recall what I have observed in patients who, like this one, had fracture with considerable separation.

It may even happen that this duration will be longer than I said. I showed you that we have here also a traumatic arthritis; now, this arthritis may remain painful for a longer time, and compel the patient to take care of himself and not to work for six, eight, or ten months. I ought to tell you that I have but little fear of this prolongation, for he is still quite young, healthy, and not rheumatic.

The prognosis is also bad in this way, that the arthritis may possibly leave behind it an incomplete anchylosis, with very notable diminution of the movements of the knee, or even a complete anchylosis.

I had occasion to show here last year, a man, 56 years old, who after a well-managed treatment of a fracture of the patella, recovered without separation and with, very probably, a bony callus, but with almost complete anchylosis of the knee. I should have more fear of such consequences if our patient was older.

Suppose that the concomitant arthritis does not last long and is not followed by anatomical modifications injurious to the functions of the limb, the prognosis is still bad, in this sense, that this limb will not recover the integrity of its functions and the strength which it previously had. It would recover them if we should be so fortunate as to obtain either a bony callus or a fibrous one sufficiently short and solid to transmit the full effects of the contraction of the quadriceps to the ligamentum patellæ and the leg. Certainly such a result is not impossible.

I have preserved notes upon 20 patients whom I have treated during the last fifteen years for fractures of the patella with separation varying from one-third of an inch to an inch and a quarter, and in only two of them have I obtained a bony or fibrous callus, solid enough to allow the heel to be raised from the bed without bending the knee, and to cause the transmission to the lower portion of the patella of movements communicated to the upper portion, and reciprocally. And as one of them was twenty-two, and the other twenty-five years old, I ask myself if youth was not the principal condition which allowed this fortunate result to be obtained.

In the others recovery took place with considerable separation. The patients lost their ability to raise the heel from the bed or the sole from the ground without a previous involuntary bending of the knee. Their patellæ were composed of two pieces which could be moved independently of each other, and all had the same difficulty in descending the stairs when the knee was not supported by a knee-cap. Without that help they could only go from one step to the next by placing both feet upon the first and then advancing the uninjured one.

I fear still more a persistence of the separation when, pressing the two pieces towards one another with my hands, I do not succeed in bringing them into contact. That is the criterion which I recommend to you. When with your two hands you can bring the fragments into contact, there is hope of recovery without separation. This hope has less foundation when this contact cannot be obtained.

Dr. Lecoin, a former interne at the Vincennes Asylum,[1] had the good idea to record[2] the results which he observed during more than two years upon patients who, after having been treated in the different wards of the Paris hospitals, had been admitted to the asylum at Vincennes for their convalescence. These patients were 26 in number, but as one of them had had an iterative fracture of the same patella, the author makes the number 27. Well, in 23 of these there was a separation which varied from one-third to one and two-thirds of an inch, with independent mobility of each fragment. They had been treated by various apparatuses, some by the trough and elevation only, most of them by an immovable apparatus, two by M. Trélat's apparatus, one by this apparatus with Verneuil's modification, one by Laugier's rubber rings, two by Valette's (of Lyons) apparatus.

[1] Situated outside of Paris, and designed for the reception of convalescents coming from the hospitals.

[2] Lecoin, Thèses de Paris, 1869, No. 249.

Notwithstanding the incontestable advantages of these methods, which I shall explain more fully in a moment, notwithstanding the talent and care of the surgeons, the separation persisted with an imperfect consolidation which left the patients in conditions nearly the same as those of non-consolidation.

As for the other four, they are given as recoveries with a bony callus. But the author could not learn in each case whether the fracture had been originally with or without separation. In one of them alone was it known that M. Cusco had made the diagnosis of fracture without separation, a fact which easily accounts for that callus being favourable.

On this point we know nothing in the other three. I will admit that all of them owed their bony callus to successful treatment of a fracture with notable separation; we should thus have three good results out of twenty-six, a proportion similar to mine (two good results out of twenty).

Can we obtain a better proportion? I believe so; but the proof is yet to be given.

Malgaigne[1] perhaps darkened a little the list of the inconveniences left by fracture of the patella which was healed with separation. Undoubtedly the limb remains weakened, in this sense, that the contractions of the quadriceps are no longer utilized except by means of the transmission of their effect through the fibrous tissues on each side of the patella, and by an elongated patella, the movable upper fragment of which consumes most of the effort which is communicated to it, and transmits but a very small part to the lower fragment.

We must also take into account the muscular diminution which I have often mentioned when speaking of fractures of the thigh and leg, and of which I showed you an example in a patient affected with an ancient fracture of the patella. But, nevertheless, most of the patients, all those who have retained neither arthritis nor anchylosis, and who suffer only the consequences relating to the quadriceps, become able to walk very easily without a cane, to take long walks without fatigue, and, in short, to no longer notice their fracture or the weakness of the limb, except when they go up, and especially when they come down staircases. Perhaps Malgaigne, in the estimate which he made of the results, did not sufficiently distinguish between that which was the consequence of the arthritis, and that which was the consequence of the weakening of the triceps, which was undoubtedly because he examined the patients too soon after the accident.

To exactly appreciate the consequences of a fracture of the patella they should be studied several years after the accident, and after being satisfied that the arthritis has left no bad result.

I must now mention another unfortunate element of the prognosis. The patient may perhaps break the other patella, and break it in the same way, by muscular action, and with separation of the fragments. I have seen an example of this, as have also Malgaigne,[2] Demarquay,[3]

[1] Malgaigne, Journal de Chirurgie, t. 1er, p. 201; and Traité des Fractures, p. 751.
[2] Demarquay, Gazette des Hôpitaux, 1866, p. 523.
[3] Malgaigne, Gazette des Hôpitaux, 1853, p. 312.